Series 1949, No. 7 Issued December 1958

Fulton County Georgia

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE

How to Use THE SOIL SURVEY REPORT

THIS SURVEY of Fulton County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils, shows their location and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things

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Walker, J. H

Soil survey, Fulton County, Georgia [by J. H. Walker and others. Correlation by A. H. Hasty. Washington, U. S. Govt. Print. Off.,] 1958.

79 p. illus., maps (part fold. col.) 29 cm. (U. S. Soil Conservation Service. Soil survey, ser. 1949, no. 7)

Cover title.
Report rev. by R. C. Jurney.
In cooperation with the University of Georgia, College of Agriculture.
"Literature cited": p. 65.

1. Soil-surveys—Georgia—Fulton Co. (Series)

[S591.A22 1949, no. 7] 631.47 Agr. 58–304

U. S. Dept. of Agr. Libr. 1So32F 1949, no. 7
for Library of Congress

SOIL SURVEY OF FULTON COUNTY, GEORGIA[1]

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United States Department of Agriculture, Soil Conservation Service, in Cooperation with the University of Georgia, College of Agriculture

General Character of the Area

FULTON COUNTY is entirely within the Atlanta Plateau. It is made up principally of rolling to hilly and broad smooth uplands, although some level flood plains occur along the Chattahoochee River and many of its tributaries. Corn, oats, wheat, and hay are important crops. Cotton is the principal cash crop. Vegetables are grown for home use and for market.

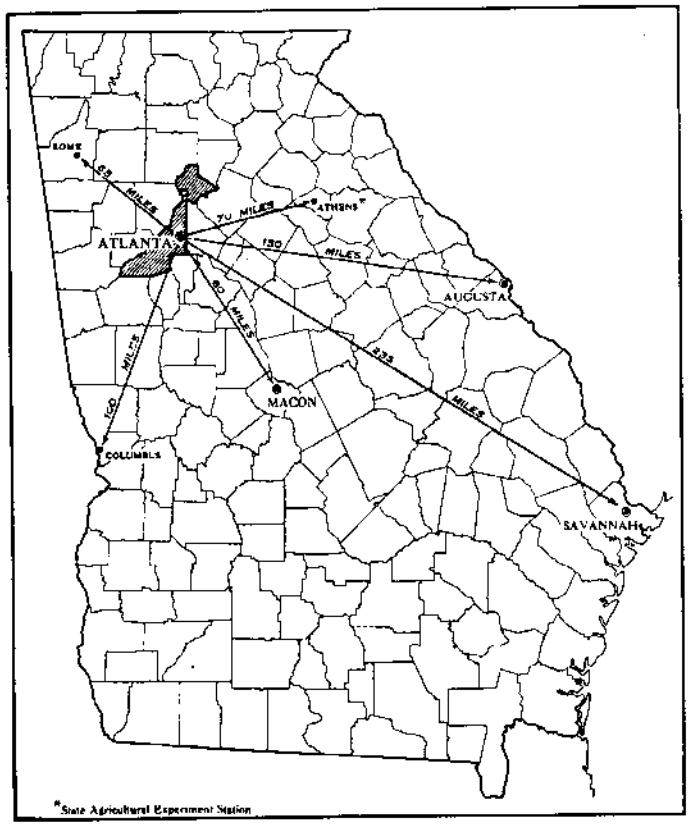


Figure 1.—Location of Fulton County in Georgia.

Dairy cattle, poultry, and some beef cattle and hogs are raised. The county has many industries, mainly in Atlanta and its suburbs.

Location and Extent

Fulton County is in the north-central part of Georgia (fig. 1). Its area is 523 square miles or 334,720 acres. The outline of the county is irregular; the longest dimension is northeast-southwest. Atlanta, the State capital and county seat, is approximately in the center of the county. Distances from Atlanta to well-known places in Georgia are shown in figure 1.

Physiography, Relief, and Drainage

Fulton County lies wholly within the Atlanta Plateau (*8*)[3], which is a part of the Piedmont province (*5*). This province is a major physiographic division of the United States and extends from southern New York to central Alabama. The Atlanta Plateau has a rolling surface characterized by moderate slopes but has no great relief. One of its most striking features is the valley of the Chattahoochee River, ranging from 150 to 400 feet in depth and from 2 to 5 miles in width from rim to rim.

The general surface features of the county are characterized by rolling to hilly and broad smooth uplands. The largest areas of smooth land are in the northern part of the county near Roswell and Alpharetta and on the drainage divide extending southwest from Atlanta to Palmetto. The areas most dissected border the Chattahoochee and Little Rivers and some of their larger tributaries. These areas have steep V-shaped valleys and sharp ridgetops, and their slopes range generally from 20 to 40 percent. The rolling land has low ridges and rounded knobs with deposits of colluvial-alluvial material in depressions and along drainageways.

Level or nearly level flood plains occur along the Chattahoochee River and many of its tributaries. The flood plain is a few yards to nearly half a mile wide along this river and is largest in the northern part near where the river enters the county. Remnants of stream terraces lie above the flood plain at two or possibly more levels. In many places the alluvial deposits making up these terraces are thin and considerably dissected by drainageways.

Where the Chattahoochee River enters the county, the elevation is approximately 900 feet and where it leaves it, about 75 miles to the southwest, the elevation is approximately 700 feet. The stream course is nearly southwesterly and approximately parallel to the trend of the geologic structure (*8*). In the southern part of the county the ridgetops lie at elevations ranging from 1,000 to 1,050 feet. North of Atlanta the higher elevations range from 1,100 to more than 1,200 feet at

[1] This report was revised by R. C. JURNEY, Soil Survey, United States Department of Agriculture.

[2] Fieldwork for this survey was done while Soil Survey was a part of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

[3] Italic numbers in parentheses refer to Literature Cited, p. 65.

a point about 5 miles west of Alpharetta. Elevations at several places in the county are as follows: Alpharetta, 1,130 feet; Roswell, 1,072; College Park, 1,057; Atlanta, 1,050; Fairburn, 1,041; Stonewall, 1,024; and Ben Hill, 962.

The drainage system of the county is characterized by a dendritic drainage pattern. The pattern is well developed throughout the uplands, and surface drainage nearly everywhere is good to excessive. For much of Fulton County, drainage is into the Gulf of Mexico by way of the Chattahoochee and Little Rivers and tributaries of the Flint River. About 35 square miles, including the southern part of Atlanta and the adjacent area to the south, is drained eastward into the Atlantic Ocean by tributaries of the South River.

Most of the first bottoms of the Chattahoochee River are well drained, yet they are subject to overflow several times during the year. In many places along other streams, however, sediments recently washed from the surrounding uplands have filled the channels and altered drainage. As a result, many areas along small streams are swampy or semiswampy much of the year. In most places this altered drainage has not had sufficient time to change the characteristics of the soil profile, but some areas are too wet for cultivated crops.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Atlanta, Fulton County, Ga.*

[Elevation, 977 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1954)	Wettest year (1948)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	45.2	73	1	4.55	3.00	4.11	0.5
January	44.6	76	−2	4.67	3.73	3.47	1.0
February	46.7	78	−8	4.82	2.70	6.20	.9
Winter	45.5	78	−8	14.04	9.43	13.78	2.4
March	52.7	87	8	5.67	3.07	10.19	.2
April	61.7	93	25	4.42	1.91	2.82	.1
May	70.0	97	38	3.82	3.31	7.83	0
Spring	61.5	97	8	13.91	8.29	20.84	.3
June	77.7	100	39	4.02	2.08	1.32	0
July	79.5	103	58	4.41	6.31	11.26	0
August	78.6	100	55	3.81	1.14	4.20	0
Summer	78.6	103	39	12.24	9.53	16.78	0
September	74.4	102	43	2.96	.26	3.60	0
October	63.4	94	28	2.60	.17	.73	(3)
November	51.9	82	14	3.41	4.12	15.72	.1
Fall	63.2	102	14	8.97	4.55	20.05	.1
Year	62.2	103	−8	49.16	31.80	71.45	2.8

[1] Average temperature based on 21-year record, through 1955; highest and lowest temperatures on a 52-year record, 1879-1930.

[2] Average precipitation based on a 21-year record, through 1955; wettest and driest years based on a 90-year record, 1859-1955; snowfall, based on a 41-year record through 1930.

[3] Trace.

Climate

The climate of Fulton County is humid and continental. The winters are mild, but they have very changeable temperature. The prevailing wind during winter is northerly. The weather is largely controlled by movement of areas of high and low barometric pressure and the accompanying winds. In winter these conditions cause frequent alternation of warm moist southerly winds and cold dry northerly winds (*7*). Data on normal monthly, seasonal, and annual temperature and precipitation at Atlanta are given in table 1.

The average winter temperature is 45.5° F. The temperature usually rises rapidly in March and April. The difference between the midwinter (January) average and that of midsummer (July) is 34.9°, which is relatively small compared with a difference of 60° in some of the more northern States. The summers are warm but are comparatively free from oppressive heat, because of the altitude and latitude of the county. The average summer temperature is 78.6°.

The average date of the last killing frost in spring is March 29, and that of the first in fall, November 8. The growing season therefore averages 224 days and is sufficient for the production of all the crops commonly grown. Fruit tree blossoms, especially peach

the heaving produced by alternate freezing and thawing. Damage to these crops rarely occurs on the better drained sandy soils.

The length of the grazing period depends on the kinds of pasture plants sown and on the amount of fertilizer used. The grazing period for pasture consisting of bermudagrass, broomsedge, crabgrass, common lespedeza, and weeds extends from the latter part of March to the latter part of October. This period can be lengthened by use of proper fertilizers and by seeding with clovers, coastal bermudagrass, tall fescue, orchardgrass, and ryegrass. Permanent pasture should be supplemented with temporary pasture during dur-

subject to boll-weevil infestation. Crops on light sandy soils are damaged more from the lack of moisture than those on many of the heavier soils. The snowfall is very light and remains on the ground for only a brief time.

The rainfall reaches a peak in winter and another in midsummer. Fall is the driest season of the year. About half of the annual rainfall comes in quantities of 1 inch or more in a 24-hour period (*14*).

Water Supply

The water supply is generally adequate for farm and home use. A shortage sometimes occurs during September, October, and November. Wells and springs provide water for the farm homes. The wells are dug about 40 to 60 feet deep and usually have a dependable supply of water throughout the year. Springs, branches, creeks, farm ponds, and larger streams are the main source of water for cattle and other livestock. A municipal water system is rapidly expanding in the county, but many outlying areas still depend on wells and springs. The county has an abundance of artificial lakes for fishing, boating, and swimming. Many irrigation systems have been installed in recent years. Water for irrigation is supplied by streams and lakes.

Vegetation

The original oak-pine forest that covered the county was typical of a broad forested area extending eastward and southward from the Appalachian Mountains to the Coastal Plain (*10*). The present tree growth is similar to the original, but it is less extensive. The largest forests are now confined to hilly and steep lands that border the Chattahoochee River and its larger tributaries. Almost every farm of the county, however, has a woodlot.

In the forest the dominant oak species are white, common red, scarlet, black, and blackjack. Shortleaf is the chief pine; scrub and loblolly pines occur in small numbers. Common plants in the undergrowth are flowering dogwood, greenbrier, wild rose, and blackberry.

Abandoned fields are covered with broomsedge and, in places, bermudagrass. Areas that are not burned over frequently are gradually taken over by pine and scattered sassafras or oak. Fulton County has a good fire control system, and fires are kept at a minimum.

Scientific and common names of some of the trees and woody plants in the county are as follows:

Scientific name	*Common name*
Cornus florida	Flowering dogwood.
Pinus echinata	Shortleaf pine.
P. taeda	Loblolly pine.
P. virginiana	Virginia pine.
Quercus alba	White oak.
Q. coccinea var. *tuberculata*	Scarlet oak.
Q. marilandica	Blackjack oak.
Q. rubra	Southern red oak.
Q. velutina	Black oak.
Rosa sp.	Rose.
Rubus sp.	Blackberry.
Smilax sp.	Greenbrier.

Settlement and Population

Fulton County was created by an act of the State Legislature in 1853 from a part of De Kalb County. In 1932 Milton and Campbell Counties were merged with Fulton County by an act of the State Legislature and the vote of the people in each county. The land in the county lying south of the Chattahoochee River was acquired from the Creek Indians in 1821, and that north of the river was acquired in 1835 by treaty with the Cherokee Indians (*3*).

A group of families from Franklin County settled near the present site of Ben Hill in 1822. Other settlers probably came to the county at about this time. The first settlers were mainly from other parts of the State and were of English, Scottish, Irish, and French descent. After the Revolutionary War a large number of people came from other States.

Fulton County had a population of 473,572 in 1950. The urban population was 407,076. The average number of persons to the square mile was 905.5. Atlanta, East Point, College Park, and Hapeville are the most populous places in the county. In 1950 they had populations as follows: Atlanta, 331,314; East Point, 21,080; College Park, 14,535; and Hapeville, 8,560. Smaller places and their populations are: Roswell, 2,123; Fairburn, 1,889; Palmetto, 1,257; Union City, 1,490; and Alpharetta, 917.

Industries

Fulton County has many industries. Some of the major industries produce textiles, chemicals, iron and steel, fertilizers, food products, furniture, paper and paper products, soft drinks, and confectionary. The printing and publishing business employs many people. In 1948 branch factories, warehouses, or branch offices of 3,150 nationally known business organizations were located in Atlanta, according to the Atlanta Chamber of Commerce.

No single industry is dominant in the county. Most of the industries are in Atlanta and its suburbs. Many of the rural population work in the city. Some of them operate small farms with hired help or tenants.

Transportation and Markets

Atlanta is the transportation and communication center of the southeastern United States. The third largest telegraph and telephone switching center in the world serves the city. Transportation in Atlanta and suburbs is furnished by buses and trackless trolleys, and bus routes serve the nearby towns. Federal-State highways and State highways serve the county. There are many miles of paved roads, and the gravel and graded roads are kept in good condition. In 1950, 854 farms were located on hard-surfaced roads; 135 on gravel, shell, or shale roads; and 1,069 on dirt or unimproved roads.

Atlanta, Decatur, Palmetto, Fairburn, Roswell, and Alpharetta are principal markets for agricultural products. Vegetables are sold to Atlanta stores and

homes and also at markets in Atlanta for wider distribution. Cattle are sold in Atlanta for slaughter in packing houses.

Community Facilities

Fulton County has 81 elementary schools and 11 high schools. As of 1949, more than 500 churches were located throughout the county. In Atlanta there are 54 elementary schools, 9 high schools, and 22 schools of college level. There are also 15 hospitals, 12 related institutions, and 12 clinics.

Recreational facilities include golf courses and several county or privately operated parks with swimming and picnic accommodations.

Agriculture

The first Europeans to visit this area found well-organized Indian tribes located in permanent communities and engaged in the cultivation of maize, beans, pumpkins, melons, and many kinds of fruits. They had also developed great skill in making utensils, agricultural implements, weapons, and ornaments of copper, stone, and other materials (*3*).

The agriculture of the early settlers was self-sufficing. The chief crops were corn, wheat, oats, barley, and rye, supplemented by garden vegetables and fruit. Cattle, hogs, and sheep were raised for meat. Wool was spun and woven for clothes. Transportation was slow. Boats and pack horses carried most of the products traded, and frequently the settlers walked long distances to market their produce or trade their cattle. Most of the labor was performed by the family, but one family could cultivate only a few acres by the crude methods used. The sandy soils were preferred for agriculture, as they were most easily worked with the available implements.

Gradual development of transportation and high prices for cotton during the early 1830's rapidly changed this self-sufficient type of agriculture into a one-crop system. Short-staple cotton soon became the cash crop. Clean cultivation on moderately to steeply sloping land and high rainfall rapidly depleted soil fertility and accelerated erosion. When the land had deteriorated to the extent that yields were low, the farmers would abandon their fields and clear new land.

Agriculture is now well diversified. It consists of the growing of subsistence crops, chiefly corn, oats, wheat, and hay. Cotton is the chief cash crop. Vegetables for home gardens and truck crops are extensively grown, and fruit trees are kept on many farms, mainly for home use. The livestock industry consists principally of dairying and poultry raising. Some beef cattle and hogs are raised.

Land Use

The aggregate land in farms in 1950 was 158,206 acres, or 47.3 percent of the county. The acreage in farms was divided as follows: Cropland harvested, 38,364 acres; plowable pasture, 9,969; woodland, 69,004; and all other land, 40,869. The nonfarm land is to some extent in urban uses and large estates.

Type and Size of Farms

Most of the farmers grow products primarily for home use. According to the 1950 census, the 2,087 farms in the county were divided as follows:

	Number
Field crop	273
Vegetable	24
Dairy	30
Poultry	351
Livestock	60
General farms	62
Miscellaneous and unclassified	1,287

In 1950 the farms in the county ranged in size from less than 10 to more than 1,000 acres. Their average size was 75.8 acres. The large farms are predominantly along the Chattahoochee River terraces and bottoms, along some of the larger streams in the northwestern part of the county, on uplands near Alpharetta and Roswell, and in the vicinity of Palmetto and Fairburn. A few are in other parts of the county. The equivalent of 1-, 2-, and 3-horse farms are widely scattered over the agricultural areas.

Crops

Although the acreage planted to various crops has fluctuated, it has generally increased, partly because of the annexation of land from other counties. Corn decreased in acreage between 1939 and 1949. The acreage of oats and hay increased in this period. Cotton acreage has fluctuated considerably; in 1949 it was nearly half that in 1939. The acreage of the principal crops in stated years is shown in table 2.

Corn is the most extensively grown crop, but not enough is produced to feed the work animals, cows, poultry, and hogs in the county. A small quantity of corn is ground for home use. Oats and wheat are mostly grown in small fields, principally for farm use.

Truck crops produce some income on many farms. In 1949 vegetables were harvested for sale from 1,043 acres as follows: Green beans, 125 acres; cabbage, 17 acres; sweet corn, 138 acres; green peas, 13 acres; tomatoes, 88 acres; and all other vegetables and melons, 662 acres.

Orchard fruits, grapes, and small fruits are produced to supply home needs, and many farms have small surpluses for local markets. Boxwood and ornamental plants are grown on some farms as a source of supplemental income.

Rotations and Fertilizers

Farmers getting the best results use variations of a corn-cotton-small grain-hay rotation. Nevertheless many farmers plant row crops year after year on the same land.

In 1940 about 61 percent of the farmers reported

TABLE 2.—*Acreage of principal crops and number of bearing fruit trees and grapevines in Fulton County.*

of farms produce milk and other dairy products for local and Atlanta markets. In 1949, 390 farms re-

TABLE 3.—*Soil series of Fulton County, Ga., grouped by topographic position, parent material, and drainage*

Parent material	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
SOILS OF UPLANDS						
Residuum from weathering of—						
Gneiss or granite, or mica schist in places.	Cecil	Cecil	Cecil			
Porphyritic granite	Lockhart	Lockhart	Lockhart			
Granite or gneiss; mica schist in places	Louisburg Appling	Louisburg Appling	Appling			
Aplitic granite, with diorite in places					Helena	
Mica schist or quartz mica schist	Louisa Madison	Louisa Madison Grover [1]	Louisa Madison Grover [1]			
Hornblende schist or diorite		Davidson [2]	Davidson [2]	Mecklenburg	Iredell	
Basic rock and granite, gneiss or mica schist mixed.	Lloyd	Lloyd	Lloyd			
SOILS OF COLLUVIAL SLOPES						
Local colluvium and alluvium washed chiefly from—						
Appling and Cecil soils						Worsham.
Appling, Cecil, and Madison soils			Seneca			
Lloyd, Davidson, Cecil, and Madison soils.			Starr			
SOILS OF STREAM TERRACES						
Old alluvium on high stream terraces	Molena Hiwassee	Molena Hiwassee	Hiwassee			
Moderately young alluvium on low stream terraces.		Altavista	Wickham Altavista	Altavista	Augusta	
SOILS OF FIRST BOTTOMS						
Young alluvium	Buncombe		Congaree		Chewacla	Wehadkee.

[1] In some areas the parent rock of the Grover series is highly micaceous gneiss.

[2] Hornblende schist is the principal parent rock of the Davidson series in this county.

corn. He also has use of land for a garden and forage crops, a house and outbuildings, and woodlot.

The sharecropper is furnished work stock, tools, and usually a small cash loan each month to be repaid when the crop is sold. He receives half of the net proceeds when the crop is sold and also has the use of the farm buildings.

In most instances contracts are made on a yearly basis and renewed at the end of each year. The length of time a tenant remains on a farm varies widely. About one-third of the tenants move every year.

Farm Buildings and Farm Home Conveniences

On some of the farms, especially those on the better soils, ... out modern conveniences, and they are usually in poor condition.

Rural mail routes serve all the communities. In 1950, 1,914 farms had electricity from a power line. In the same year 583 farms had telephones and 978 had running water.

The Soils of Fulton County

Differences in suitability of the soils have affected the agriculture of Fulton County. For example, the well-drained Congaree soils on the first bottoms are well suited to corn, whereas the poorly drained Wehadkee soils, which are associated with them along the streams, are poorly suited to corn.

The Cecil, Madison, Appling, and Lloyd soils domi-

stimulated the development of general farming as well as special types of farming. Consequently, better economic conditions prevail on farms on these soils than in areas where the soils have unfavorable characteristics.

Soils having rolling to hilly slopes have been seriously damaged by erosion in many areas, and as a result much of this land is idle. The steep deeply dissected areas—dominantly Louisa and Louisburg soils—are conspicuous for their lack of crops. They are mainly in forest, to which use they are best suited.

Much of the land under cultivation, as well as that once tilled and abandoned, is eroded to various degrees. About half of the area of the county shows moderate erosion, and severe erosion occurs on about 5,600 acres—usually on steep and hilly slopes.

In many places the stream channels have filled with sand washed from the upland slopes. During high water some of this sandy material has spread over the original dark silt loam and buried it. Thus, these once fertile and productive soils of the first bottoms have become almost worthless for farming. Furthermore the water table has risen in places, so that the land is too wet for crops much of the time.

Differences in the physical and chemical characteristics of the soils can be attributed largely to differences in their parent materials. Relief also influences soils. One indication of such an influence is the thick well-developed subsoil of the nearly level soils, as contrasted to the thinner subsoils of the sloping phases of these same soils. Erosion may influence soils by altering or removing the surface layer.

Soil Series and Their Relations

The soils of Fulton County are classified in 24 series and 10 miscellaneous land types. The series are grouped according to their position on the landscape as follows: (1) Soils of uplands, (2) soils of colluvial slopes, (3) soils of stream terraces, and (4) soils of first bottoms (table 3).

The soils of uplands have formed from material weathered from bedrock. The soils of colluvial lands have formed from materials washed or sloughed from adjacent slopes and deposited on lower slopes, or from local alluvium along drainageways. Soils of stream terraces are from alluvium deposited on benchlike positions bordering first bottoms, although some occupy remnants of old terraces. Soils of the bottom lands occupy the nearly level positions near streams and consist of waterborne material. They are subject to overflow by the adjacent streams. Miscellaneous land types are composed of areas having no true soil; ten have been mapped in the county.

Soil Series, Types, and Phases

In the following pages the soils of Fulton County, identified by the symbols used on the soil map and by symbols showing their management group, are described in detail. Their relations to agriculture are discussed, including present use and management, use suitability, and management requirements. The areas occupied by the various kinds of soil are shown on the soil map that accompanies this report. The approximate acreage and proportionate extent of each soil mapped are listed in table 4. The estimated acreages of each soil cultivated, pastured, forested, and idle are also given in this table 4.

ALTAVISTA SERIES

The Altavista soils occur on low stream terraces and are moderately well drained to well drained. They are associated with Augusta and Wickham soils. They differ from Augusta soils in having a less heavy subsoil, somewhat better drainage, and usually a higher level of productivity. They differ from Wickham soils in having a light brownish profile, less favorable drainage, and, on the whole, a lower level of productivity. Slopes range from level to rolling but are dominantly undulating.

Altavista soils are deep to parent materials that differ significantly in derivation. They are generally low in organic-matter content and range from medium to strongly acid. They are used mainly for cultivated crops and pasture, but productivity is medium to low under the soil management usually practiced.

Altavista fine sandy loam, undulating phase (2 to 6 percent slopes) (Ab).—This friable moderately well-drained soil is associated with the reddish Wickham soils of the low stream terraces and in places it is subject to overflow during periods of exceptionally high water. It has formed from moderately young alluvium consisting of materials washed from Cecil, Appling, Madison, Davidson, and related soils. The largest areas are in the northeast near the Chattahoochee River. The total acreage is fairly small, yet the soil is suited to many crops and is valuable to the farms on which it occurs.

Profile in a cultivated area:

Surface soil—
0 to 12 inches, light olive-brown very friable fine sandy loam; weak medium crumb structure.

Subsoil—
12 to 25 inches, olive-yellow, firm, heavy fine sandy clay loam; moderate medium blocky structure.
25 to 48 inches, light olive-brown friable fine sandy clay loam; moderate number of red distinctly visible medium-sized mottles, or color patches; moderate fine blocky structure.

Underlying material—
48 inches +, varicolored alluvial material consisting principally of sand, silt, clay, and a little gravel.

The soil varies somewhat in color, texture, consistence, and thickness of the surface soil and subsoil layers. In some areas a few mica flakes occur throughout the profile.

This soil is inherently low in supply of plant nutrients. It has medium to slow runoff and medium internal drainage. The surface soil has moderately rapid permeability, and the subsoil moderate to slow. The soil is moderately retentive of moisture and applied plant nutrients.

In nearly half of the mapped area, the soil has been moderately eroded. The remaining surface layer is about 3 to 6 inches thick. In the thinnest areas subsoil material has been mixed in the plow layer by tillage, and the surface layer is more clayey and some-

TABLE 4.—*Acreage in cultivated crops, pasture, forest, and idle, and the total acreage and the proportionate*

TABLE 4.—*Acreage in cultivated crops, pasture, forest, and idle, and the total acreage and the proportionate extent of soils mapped in Fulton County, Ga.—Continued*

Soils	Cultivated crops	Pasture	Forest	Idle	Total	
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Percent*

what heavier than elsewhere. Other characteristics of this eroded soil are about the same as those of the uneroded areas, and use suitability is similar.

Use and management (Group A–3)[4].—Corn and cotton are the principal crops; small grains and hay are also grown. Under common management average yields are low; they are higher under improved management. The soil has very good workability. It can be cultivated over a wide range of moisture conditions and can be worked sooner after rains than the heavy red soils of the uplands. Conservability is good, and erosion control is comparatively easy.

This soil responds well to fertilizers and good management practices. Its productivity can be improved by turning under leguminous crops, by applying lime and large amounts of fertilizer, and by using suitable rotations. In the eroded areas longer rotations and other measures to control erosion may be needed. Crops well suited to this soil are corn, cotton, rye, oats, crimson clover, lespedeza, soybeans, cowpeas, grasses, potatoes, sweetpotatoes, melons and garden vegetables.

Altavista fine sandy loam, level phase (0 to 2 percent slopes) (As).—This soil is similar to Altavista fine sandy loam, undulating phase, in all physical characteristics, but it occupies level or nearly level areas. In many places the profile layers contain a few small mica flakes that vary in color, texture, consistence, and thickness. This soil is low in fertility. Surface runoff is slow, and erosion is not a serious hazard. Internal drainage is medium. Permeability is moderately rapid in the surface soil and moderate to slow in the subsoil. Moisture and applied plant nutrients are retained moderately well.

About 104 acres of Altavista silt loam, level phase, is mapped with this soil. This included soil occupies somewhat lower positions on stream terraces and has a finer texture and poorer drainage. It is faintly mottled in the lower part. Most of the included soil is cultivated; corn and hay are the chief crops.

Use and management (Group A–3).—Except on the included Altavista silt loam, level phase, the crops grown and the yields produced are similar to those on Altavista fine sandy loam, undulating phase. The two soils can be managed in the same way. Corn, hay, and pasture are the most suitable crops for Altavista fine sandy loam, level phase. This soil is very easy to work and conserve, but artificial drainage is needed in places.

Altavista fine sandy loam, eroded rolling phase (6 to 10 percent slopes) (Ac).—This soil has been subjected to moderate sheet erosion. The surface soil is olive-brown very friable fine sandy loam, 3 to 9 inches thick. In the more eroded areas where subsoil material has been mixed with the remaining surface soil by tillage, the soil to plow depth is light olive-brown to olive-brown, friable, heavy fine sandy loam. The subsoil and underlying material are similar to those of the undulating phase, but the subsoil generally is a little thinner.

This eroded soil is low in fertility. Runoff is medium to rapid, and erosion hazard is moderate to high. Internal drainage is medium. Permeability is moderate in the surface soil and moderate to slow in the subsoil. The capacity of the soil to retain moisture and applied plant nutrients is moderately good.

Mapped with this eroded soil is a total area of about 100 acres of Altavista fine sandy loam, rolling phase, from which only a small part of the surface layer has been lost. It is included because of its small acreage and the similar use suitability. An aggregate of about 8 acres of Altavista fine sandy loam, hilly phase, which has stronger slopes (10 to 15 percent gradient), is also included.

Use and management (Group A–4).—The principal crops on Altavista fine sandy loam, eroded rolling phase, are corn and cotton, although small grains (oats and rye), and hay crops are grown. Yields are usually somewhat lower than on Altavista fine sandy loam, undulating phase.

This eroded rolling phase is easily worked and fairly easily conserved. It responds to fertilizer and other amendments, and under proper management fertility can be raised to and maintained at a fairly high level. Long rotations having a maximum of close-growing crops, as well as contour plowing and terracing, should be used to control erosion on much of this soil.

APPLING SERIES

Appling soils constitute one of the major soil series of the county. They extend over an estimated 45,726 acres, or 13.7 percent of the county. They are grayland soils on upland positions that range from smooth interstream ridgetops to very strong slopes adjacent to drainageways. Relief is dominantly rolling to hilly, but some is undulating and some steep. Drainage is good to excessive and depends largely on character of the relief. The soils of this series are deep and have formed chiefly from weathered products of granite or gneiss rock, or in places from weathered products of mica schist. They are associated with soils of the Cecil series. They are unlike Cecil soils mainly in having a profile that is less red and in general more friable and in having undergone, for the most part, more leaching.

The soils of this series usually are low in organic-matter content and medium to strongly acid. Their fertility is low. Nearly twice as much of their acreage is in forest and cultivated land than is in pasture or idle land. Productivity for crops and pasture is medium to low.

Appling sandy loam, undulating phase (2 to 6 percent slopes) (Af).—This friable, light-colored, well-drained sandy soil occurs on smooth interstream ridges and mild slopes leading to drainageways. The surface soil is relatively thick.

Profile in a cultivated area:

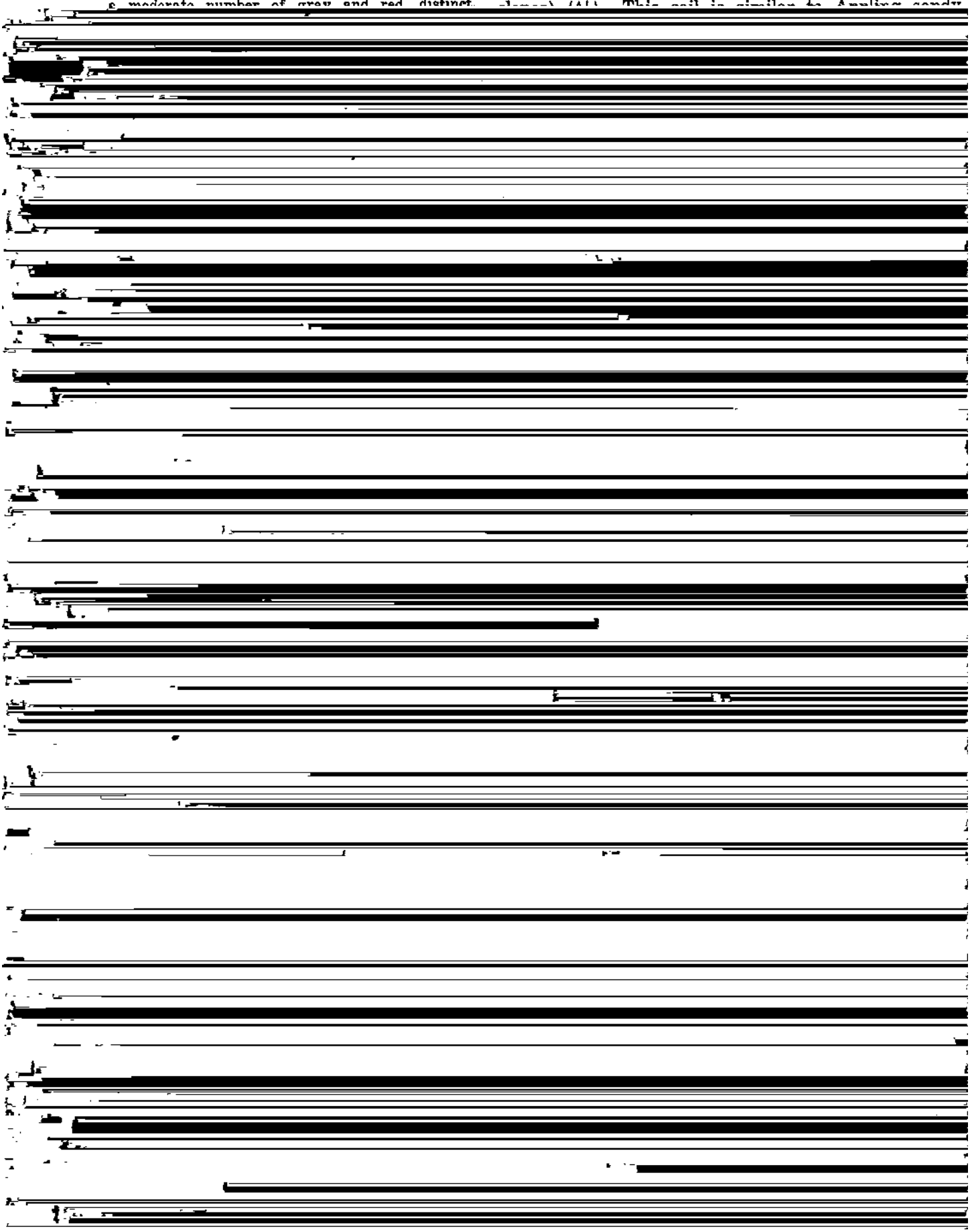
Surface soil—
0 to 12 inches, grayish-brown friable sandy loam; weak fine crumb structure.

Subsoil—
12 to 29 inches, yellowish-red firm sandy clay; moderate fine to medium blocky structure; plastic and sticky when wet, hard when dry.

[4] Numbers in parentheses refer to the management group in which the soil has been placed. These groups are discussed in the section, Management Groups.

29 to 53 inches, yellowish-red friable sandy clay having a moderate number of grey and red distinct

Appling sandy loam, rolling phase (6 to 10 percent

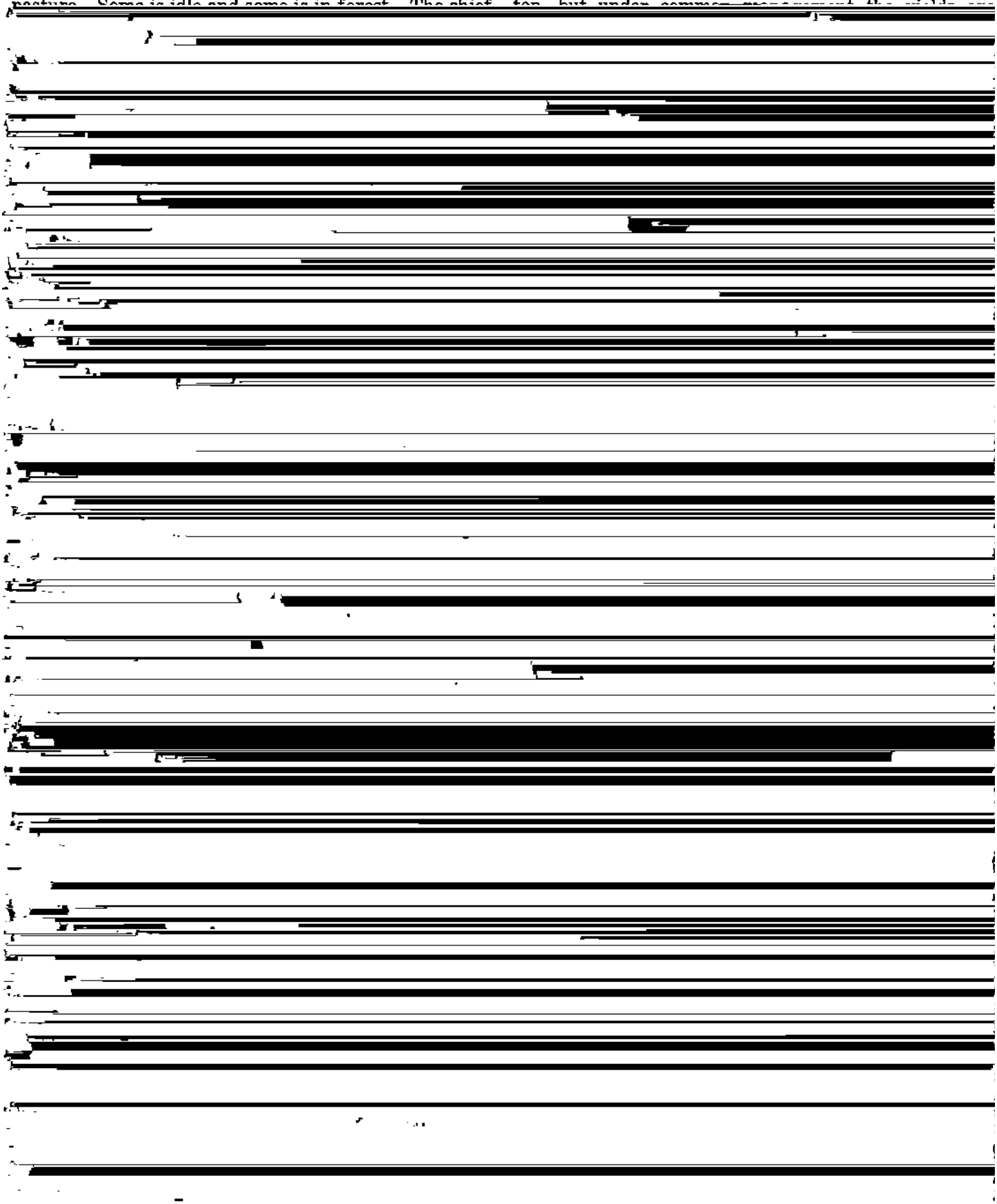


in the upper part and mottled in the lower part. The parent material is soft decayed granitic rock.

Use and management (Group A–4).—Most of Appling sandy loam, eroded rolling phase, is in crops and pasture. Some is idle and some is in forest. The chief

to moderately rapid, and in the subsoil, moderate. The soil retains moisture fairly well.

Use and management (Group B–3).—Among the crops grown on this soil are corn, lespedeza, and cot-



Profile in a cultivated area:

Surface soil—

subsoil. The organic-matter content usually is low, and the reaction is medium to strongly acid. The soil

BUNCOMBE SERIES

The deep Buncombe soil occurs on level to nearly level first bottoms that are subject to overflow by the streams. It is associated with soils of the Congaree, Chewacla, and Wehadkee series. It differs from them mainly in being made up largely of loose, porous fine sand throughout its depth and in being excessively drained.

The soil generally has a low organic-matter content and is medium acid. The greater part is in forest or idle, but some areas are cultivated or in pasture. Productivity for crops and pasture is very low.

Buncombe loamy fine sand (0 to 2 percent slopes) (Ba).—This sandy soil consists of almost unaltered young alluvium. It is loamy fine sand to depths of 36 inches or more. Except in color, it shows very lit-

The surface soil of the Cecil series varies somewhat in color, texture, consistence, and thickness, depending in a large measure on the degree of erosion.

The soils of this series are medium to strongly acid, usually low in organic matter, and low in fertility. They are used for cultivated crops, forest, and pasture. Some areas are idle. Productivity for crops and pasture is medium to very low.

Cecil sandy loam, undulating phase (2 to 6 percent slopes) (Cd).—This deep soil occurs throughout the county on smooth interstream ridges and mild slopes leading to drainageways. The separate areas are relatively small.

Profile in a forested area:

Surface soil—
0 to 8 inches, yellowish-brown friable sandy loam;

dium. Permeability is moderately rapid to moderate in the surface soil and moderate in the subsoil. The moisture-holding capacity is moderate.

About 59 acres of Cecil clay loam, severely eroded undulating phase, is mapped with this soil. The included soil, not mapped separately in this county, has lost more than 75 percent of the original surface layer. The plow layer is red to reddish-brown friable clay loam. The subsoil is red, firm, heavy clay. These severely eroded areas are indicated on the soil map by symbol. The soil can best be used for deep-rooted perennial legumes or for trees.

Use and management (Group A–2).—Most of this soil is in crops and pasture. The rest is idle or in forest. The common crops of the county are grown. Under good management, variations of the corn-cotton-small grain-hay rotation are used. Many farmers, however, do not rotate crops but plant row crops year after year. Normally, yields of corn range from 15 to 40 bushels an acre, depending on the level of management.

The soil is easily worked, and improved farm machinery can be used in most places. Conservability is good, and productivity is medium to poor. The chief management requirements are building up and maintaining fertility. The soil responds well to fertilizer and to other soil amendments. Terracing, stripcropping, contour plowing, and crop rotations are needed for erosion control. Erosion is easier to control and shorter rotations can be used on this soil than on soils having stronger slopes. Because of its many favorable qualities, this soil is well suited to many kinds of crops. Suitable crops are corn, cotton, wheat, oats, rye, crimson clover, lespedeza, soybeans, cowpeas, alfalfa, sweetpotatoes, potatoes, and garden vegetables.

Cecil sandy loam, rolling phase (6 to 10 percent slopes) (Cf).—This soil occupies fairly smooth upland ridges and gradual slopes leading to drainageways. It has stronger slopes and generally a slightly thinner surface soil and subsoil than the undulating phase. Other characteristics of the two soils are similar.

The surface soil, about 10 inches thick, is yellowish-brown friable sandy loam in about the first 7 inches and yellowish-red friable heavy sandy loam in the lower 3 inches. The subsoil is red firm clay about 26 inches thick. Below this is the parent material of red friable clay, splotched or coarsely mottled with brownish yellow. The parent material contains mica flakes and small, soft, weathered fragments of gneiss and mica schist.

Runoff is medium to rapid on this soil, and the erosion hazard is moderate to high. Internal drainage is medium. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The soil has moderate moisture-holding capacity and holds applied plant nutrients well.

Use and management (Group A–1).—Forest, consisting largely of red oak, dogwood, hickory, and pine, occupies about half of this phase. The rest is in crops and pasture. Corn, small grains, lespedeza, and cotton are among the chief crops. Corn more than doubles its average yield under improved management. The response of other crops under improved management is nearly as good as that of corn. Under the better farming practices, variations of the corn-cotton-small grain-hay rotation are used. On many areas crop rotations are not used and row crops are grown year after year.

Control of erosion and the building up and maintenance of fertility are the chief practices needed. Fertilizer and other soil amendments can be applied with good results. Erosion can be held in check by the use of terraces, stripcropping, contour tillage, and long rotations. Crops suitable for this soil are corn, cotton, wheat, oats, rye, barley, crimson clover, lespedeza, cowpeas, soybeans, alfalfa, grasses, sweetpotatoes, and potatoes.

Cecil sandy loam, eroded rolling phase (6 to 10 percent slopes) (Cg).—This is the most extensive soil in the county. It occurs on broad moderately smooth interstream divides and gradual slopes toward drainageways. Erosion has removed 25 to 75 percent of the surface layer; as a result, this layer is now only about 2 to 6 inches thick. Originally, the profile was similar to that of Cecil sandy loam, rolling phase.

To plow depth the soil is pale-yellow, reddish-brown, or red, friable sandy loam to clay loam. The color and texture of this layer depend on the quantity of red clay subsoil material that has been mixed into the plow layer by tillage. Clean-cultivated fields have a spotted appearance because numerous, small, eroded patches of red to reddish-brown clay or clay loam appear among the areas of pale-yellow sandy loam. The subsoil and parent material are similar to those of Cecil sandy loam, rolling phase.

This soil has medium to rapid runoff and moderate to high erosion hazard. Its internal drainage is medium. Permeability is moderately rapid to moderate in the surface soil and moderate in the subsoil. The moisture-holding capacity is moderate.

Use and management (Group A–1).—This is one of the most widely used soils in the county; practically all of it has been cleared and farmed. Most of this soil is cultivated. Some is in pasture, and a smaller part is idle or in forest. Many of the more eroded areas have been abandoned and are reverting to broomsedge, sassafras, and pine. All crops common to the county are grown. Under good management, including adequate fertilization, proper rotation of crops, and other good farming practices, crops make good response. For example, under prevailing management corn averages about 10 bushels an acre, but under the better practices it averages 30. The soil is easily worked, but it can be conserved only fairly easily because it is erodible. Productivity is medium to low.

The productivity of this soil can be built up to and kept at a good level. The soil is suited to crops similar to those grown on Cecil sandy loam, rolling phase. The chief management problems are control of erosion and maintenance of fertility. Helpful practices are proper use of fertilizer and other soil amendments, long rotations, terracing, stripcropping, and contour plowing.

Cecil sandy loam, hilly phase (10 to 15 percent slopes) (Ch).—This soil is similar to Cecil sandy loam, rolling phase, in color, texture, and consistence, but it has stronger slopes and slightly thinner surface soil and subsoil layers. For the most part it occupies positions near or adjacent to drainageways. Slopes are usually short and strong. Because of its hilly relief,

the soil is less desirable for cultivation than the rolling phase and is nearly everywhere subject to more erosion.

The 8-inch surface soil is yellowish-brown friable sandy loam in the first 5 inches and a yellowish-red, friable, heavy sandy loam in the bottom 3 inches. The subsoil is red firm clay about 25 inches thick. The underlying parent material is red friable clay, splotched or coarsely mottled with brownish yellow. It contains mica flakes and soft, weathered fragments of gneiss and mica schist.

Runoff is rapid on this soil, and the erosion hazard is high. Internal drainage is medium. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-holding capacity is moderate.

Use and management (Group B–3).—Most of this soil is in forest consisting mainly of red oak, dogwood, hickory, and pine. A small percentage is cultivated or in pasture. The soil has poor workability, fair conservability, and low to very low productivity. It is better suited to pasture than to cultivated crops. With

loam for the first 5 inches and yellowish-red friable heavy sandy loam in the last 2 inches. In wooded areas the soil is usually covered with a layer of leaves, twigs, and leaf mold about 2 inches thick. The red firm clay subsoil is about 24 inches thick and somewhat micaceous in the lower part. Underlying the subsoil is the parent material, a red friable clay with mottles of brownish yellow. It contains mica flakes and small decomposed fragments of gneiss and mica schist.

This soil has rapid to very rapid runoff. The erosion hazard is high to very high. Internal drainage is medium. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-holding capacity is moderate. A small part of this soil, approximately 113 acres, is very steep and has slopes of more than 25 percent.

Use and management (Group C–1).—The fairly large total area of Cecil sandy loam, steep phase, is nearly all in forest consisting mainly of red oak, dogwood, hickory, and pine. The rest is in pasture or is idle. The soil has poor to very poor workability and

able clay loam; weak medium crumb to moderate medium blocky structure.

Subsoil—

5 to 22 inches, red, firm, heavy clay; moderate medium blocky structure.

22 to 29 inches, red, firm, heavy clay; moderate medium blocky structure; fair quantity of mica flakes.

Parent material—

29 inches +, red friable clay; considerable quantity of mica flakes.

Many small gullies and a few large ones have formed in this soil. Runoff is medium to rapid, and the hazard of further erosion is moderate to high. Internal drainage is medium. The soil is moderately permeable and retains moisture moderately well.

Use and management (Group B–1).—This severely eroded rolling phase usually occurs in small tracts, but it has a fairly large aggregate area. About half of it is in pine forest. Most of the rest is idle, although some is in crops and pasture.

In cultivated areas the crops grown are mostly corn, lespedeza, and cotton. Yields are low under common management but can be improved by better practices.

This soil has poor workability, and because of its fine-textured clayey plow layer, it forms clods if not plowed when at proper moisture content. The soil is only fairly easily conserved and is low to very low in productivity. It is poorly suited to tilled crops and can be used best for pasture, or in the more severely eroded areas, for trees.

Cecil clay loam, severely eroded hilly phase (10 to 15 percent slopes) (Cb).—This soil generally occupies strong slopes near or adjacent to drainageways. Practically all or all of its original surface layer has been lost through erosion. Many gullies have developed. The present plow layer is red to reddish-brown friable clay loam consisting largely of subsoil material. The subsoil is red, firm, heavy clay about 20 to 22 inches thick. The parent material, beginning as red friable somewhat micaceous clay, grades at variable depths to soft, weathered gneiss, granite, or mica schist.

The soil has rapid runoff, and the hazard of further erosion is high. Internal drainage is medium. The soil is moderately permeable and has a moderate mois- the few small areas, slopes are stronger than 25 percent.

Runoff on this phase is rapid to very rapid, and the erosion hazard is high to very high. Internal drainage is medium. The soil is moderately permeable and has a moderate moisture-holding capacity.

Use and management (Group C–1).—Most of this soil is in second-growth pines. The rest is pasture or idle land. In nearly all places the soil is unsuited to crops and pasture because of its steep slopes, high erodibility, very poor workability and conservability, and very low productivity. For the most part, it is best used for forest.

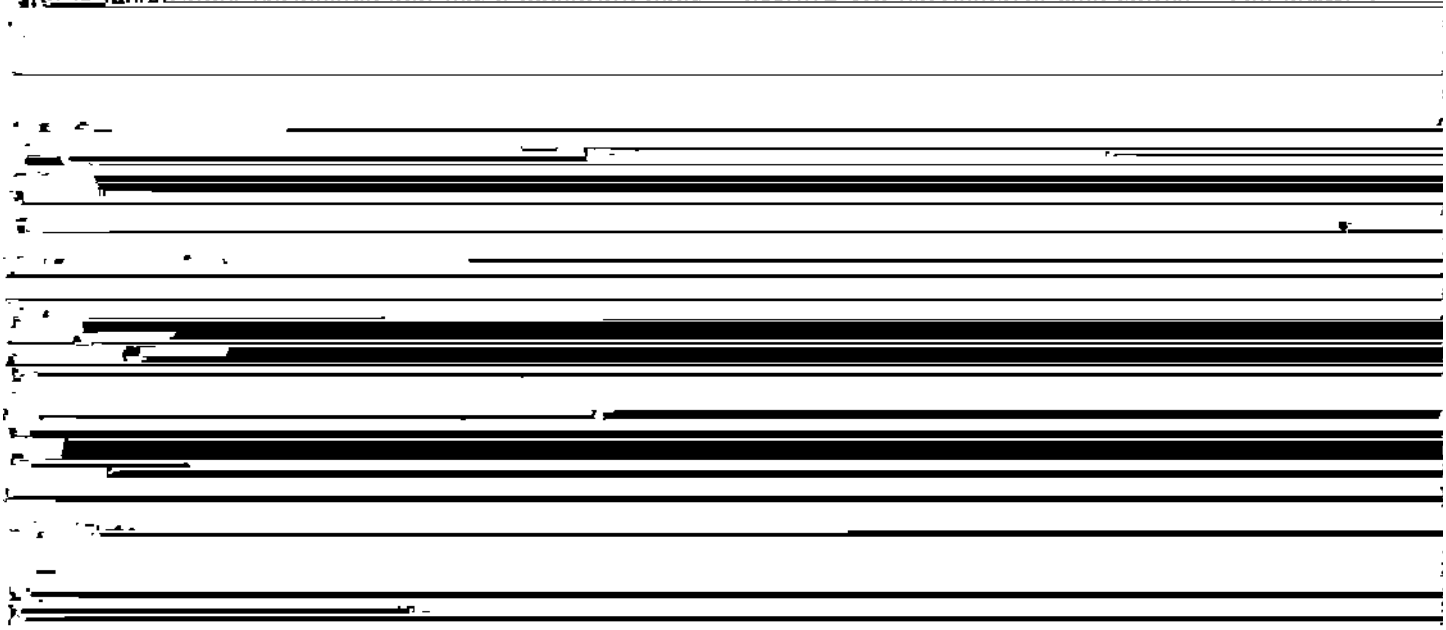
CHEWACLA SERIES

The Chewacla soils are on level or nearly level first bottoms and are subject to periodic overflow by the streams. They are associated with the well-drained Congaree soils and the poorly drained Wehadkee soils, and in drainage are about intermediate between the two. Their profile has been poorly formed, and the layers show very little distinction except in color. Although the soils are deep, the water table fluctuates and at times is relatively high.

The soils usually have a moderate organic-matter content and are medium to strongly acid. Artificial drainage, where feasible, improves the usefulness of these soils. Productivity is high for crops and pasture, but flooding reduces yields, especially of cultivated crops.

Chewacla silt loam (0 to 2 percent slopes) (Co).—This somewhat poorly drained soil has formed as level or nearly level bottom land from young alluvial material derived from Cecil, Appling, Madison, Davidson, and related soils. It is associated with the well-drained Congaree soils and the poorly drained Wehadkee soils.

The surface soil is brown and friable, but the lower layers are mottled because of insufficient drainage and aeration. The soil is fairly extensive and has characteristics favorable for agriculture. Corn, hay, and pasture are particularly well suited. The larger areas



ity is moderate in the surface soil and slow in the subsoil. The soil has a very high moisture-holding capacity. It retains plant nutrients well.

Use and management (Group A–6).—Much of this soil is used for crops and pasture. Some is in forest that consists of alders and willows and a few pines and gums. In areas where the water table is high the soil is idle much of the time. Corn is the chief crop

Chewacla and Wehadkee soils of the first bottoms, but it is better drained and usually darker. It has formed from young alluvium made up of materials derived largely from Cecil, Appling, Madison, Davidson, and associated soils. The soil has a fairly large total acreage. The larger areas lie along the Chattahoochee River. This is a useful soil, especially for the production of corn, hay, and pasture.

Congaree silt loam (0 to 2 percent slopes) (Cr).—This brown, friable, mellow soil occurs on first bottoms. It is associated with Congaree fine sandy loam and differs principally in having a finer texture.

The surface soil is dark yellowish-brown very friable silt loam, about 13 inches thick. The subsurface

The organic-matter content of the soils is fairly low to low. The soils are used mainly for cultivated crops and pasture; their productivity is medium to low.

Davidson clay loam, eroded undulating phase (2 to 6 percent slopes) (Da).—This soil occurs on interstream ridges and slopes leading to or toward drainageways.

slightly thinner subsoil. Most areas occur in the northern part of the county. The total acreage is small, but the soil has good qualities that make it important for agriculture.

The surface soil, about 3 to 7 inches thick, is dark reddish-brown friable to firm clay loam. The texture is somewhat more clayey where subsoil material has been mixed into the plow layer. The subsoil, about 48 to 50 inches thick, is dark-red firm clay. In approximately the lower 12 inches of the subsoil, the material is friable clay loam. Underlying the subsoil is the parent material, which consists of partly decomposed dark-colored rock mixed with yellow friable clay loam.

This soil has moderate fertility and is medium to strongly acid. It has medium to rapid runoff and is moderately to highly susceptible to erosion. Internal drainage is medium to slow. The soil is moderately permeable and holds moisture well.

Severely eroded areas, totaling 5 acres, are included because of small extent. In these areas nearly all or all the surface soil has been washed off, and yields are

GROVER SERIES

The Grover soils occur on uplands. They range from the smooth ridgetops down to the strong slopes near or along drainageways. Relief is dominantly undulating, but it is hilly in some areas, particularly those near drainageways. Drainage is good to excessive. The soils have moderately deep to deep profiles that have developed from residual material weathered from quartz mica schist or from highly micaceous gneiss. They are associated with the Cecil, Appling, and Madison soils. They are similar to the Madison and Louisa soils in parent material but are less red than the Madison, and deeper and less micaceous than the Louisa. Grover soils resemble Appling soils but are generally more shallow, have less depth, and contain a larger quantity of mica flakes. They have a larger mica content than the Cecil soils and are less red. The surface soil of the Grover series has been thinned by erosion.

Grover soils are generally low in organic-matter content and are medium acid. They are used principally for crops and pasture. Productivity ranges from

management, including adequate fertilization and suitable rotation of crops, yields can be improved considerably. The soil has very good workability and can be cultivated within a wider range of moisture content than soils having a less sandy surface layer. This soil responds well to proper fertilization and other good management practices. Contour tillage, stripcropping, and terracing are good measures for erosion control.

Grover fine sandy loam, eroded hilly phase (10 to 15 percent slopes) (Gb).—This soil is similar to Grover fine sandy loam, eroded undulating phase, but it has much stronger slopes and has generally thinner subsoil layers. It occupies somewhat broken relief near or adjacent to drainageways and in most places it is poorly suited to tilled crops.

The remaining surface soil, about 3 to 8 inches thick, is light olive-brown friable fine sandy loam. In the thinnest areas, however, the soil is reddish-yellow friable sandy clay loam because some of the subsoil has been mixed into the plow layer during cultivation. The 26- to 28-inch subsoil is reddish-yellow friable sandy clay loam in the upper 10 to 12 inches and brownish-yellow friable sandy clay loam in the lower 16 inches. The subsoil is underlain by friable brown-

places it cannot be reclaimed at a reasonable cost. Terraces and diversion ditches would be required, as well as seeding or natural revegetation. This land is unsuitable for crops and pasture because of severe erosion and other unfavorable features. It can be used best for trees.

HELENA SERIES

The Helena series occurs on smooth interstream ridges and gradual upland slopes near or leading to drainageways. It has formed from material weathered from aplitic granite (a fine-grained granite composed principally of quartz and feldspar), which in places is mixed with material derived from basic rock, usually diorite. The Helena soil is associated with Appling soils but differs mainly in having a heavier and more distinctly mottled subsoil. The profile is only moderately deep. Drainage is somewhat poor, largely because the subsoil is slowly permeable. Relief is prevailingly rolling.

The organic-matter content is usually low, and the soil is medium acid. Productivity for crops and pasture is low to very low.

Helena sandy loam, eroded rolling phase (6 to 10 per-

(2 to 6 percent slopes) of Helena sandy loam. Together these inclusions make up about 50 acres that are moderately eroded, 3 acres that are slightly eroded, and 1 acre that is severely eroded. Also included are about 2 acres of the moderately eroded hilly phase. All these inclusions are too small to justify separation on the soil map.

Use and management (Group B–4).—About one-third of the very small aggregate area of Helena sandy loam, eroded rolling phase, is cultivated. The rest is idle, in pasture, and in forest. Corn, wheat, oats, and lespedeza are the chief crops. Average yields are low under common management, but considerable improvement can be expected from good management. The soil has poor workability and conservability. Nevertheless, it is suitable for corn, wheat, oats, rye, grasses, lespedeza, crimson clover, cowpeas, soybeans, sweetpotatoes, and vegetables. This soil occurs in small tracts and can be used and managed like the

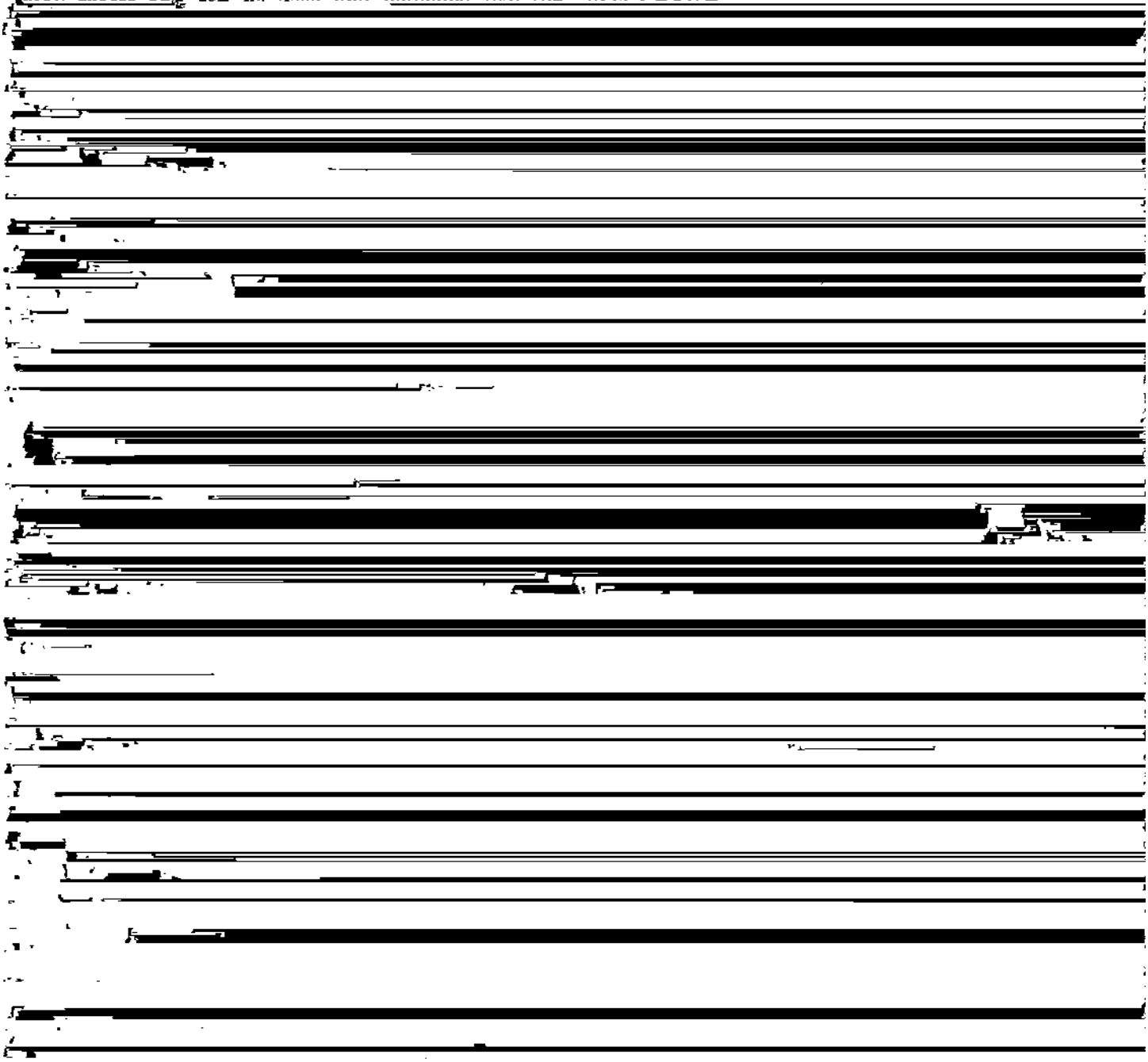
Underlying material—

52 inches +, old alluvium of reddish-brown friable fine sandy clay material mixed with gravel; a few yellow and gray distinct medium mottles.

Variations are chiefly in the color and thickness of the surface soil. This layer was originally about 10 inches thick, but erosion has reduced it to about 3 to 8 inches. In the thinnest areas the 5-inch plow layer is composed of a mixture of surface and subsoil material. It is a dark-red heavy sandy loam. The subsoil varies a little in thickness; in places it directly overlies residual rock material.

This soil has moderate fertility. Runoff and internal drainage are medium. Permeability is moderate to moderately rapid in the surface soil and moderate in the subsoil. The soil has moderate moisture-holding capacity and retains applied plant nutrients well.

As mapped this soil includes about 82 acres of undulating Hiwassee sandy loam that is uneroded or



very small aggregate area of Hiwassee sandy loam, eroded rolling phase, is cultivated. Some is in pasture, and a small percentage is idle or in forest. The chief crops are corn, oats, wheat, lespedeza, and cotton. Average yields are fairly low under prevailing management but can be expected to be higher under improved management that includes adequate fertilization. The soil has fair workability. It is relatively difficult to conserve. Appropriate measures for ero-

conservability, and low to very low productivity. Strong slopes, erodibility, and other unfavorable features make it unsuitable for crops or pasture and limit its use to forest.

IREDELL SERIES

The Iredell soil occurs mainly on rolling uplands, but some areas are on undulating uplands. It has formed

LLOYD SERIES

The Lloyd soils comprise a relatively large red-land group. They are in upland positions ranging from smooth interstream ridges to very strong slopes along drainageways. Relief is commonly rolling and hilly, but it is undulating in some areas and steep in others. Drainage is good to excessive. The soils have a deep to moderately deep profile that has formed through the decay of a mixture of basic rocks and granite, gneiss, or mica schist. Where they occur separately, the basic rocks of this mixture are the kinds that give rise to Davidson soils, and the acidic rocks (granite, gneiss, and mica schist) are the kinds that give rise to Cecil soils. The Lloyd series shows the influence of the mixed parent rocks. They closely resemble soils of the Cecil series in some characteristics and the Davidson soils in others. Their profile characteristics are intermediate between those of the Cecil and Davidson soils.

The Lloyd soils are moderate to low in organic-matter content and medium to strongly acid. They are in forest, are cultivated, or are used for pasture. Their productivity for crops and pasture ranges from medium to very low.

Lloyd sandy loam, eroded undulating phase (2 to 6 percent slopes) (Le).—This well-drained soil occupies smooth interstream ridgetops and mild slopes leading to drainageways. It is characterized by a reddish-brown friable sandy loam surface soil and a red, well-developed, firm clay subsoil.

This soil is related to Cecil, Davidson, and Madison soils but is somewhat darker than the Cecil, sandier and lighter colored than the Davidson, and less micaceous and finer textured in the subsoil than the Madison. It is one of the best upland soils for crops. Erosion, however, has been active and has reduced the surface soil to a thickness of about 3 to 9 inches. The relatively small acreage is scattered throughout the county.

Profile in a less eroded cultivated area:

Surface soil—
0 to 8 inches, reddish-brown friable sandy loam; weak fine crumb structure.
Subsoil—
8 to 40 inches, red firm clay loam; weak medium blocky structure.
Parent material—
40 inches +, reddish-brown material from decomposed basic rock and granite, gneiss, or mica schist.

The color of the profile is affected by the quantity of residual basic rock in the parent material. Where the quantity is relatively small, the color approaches that

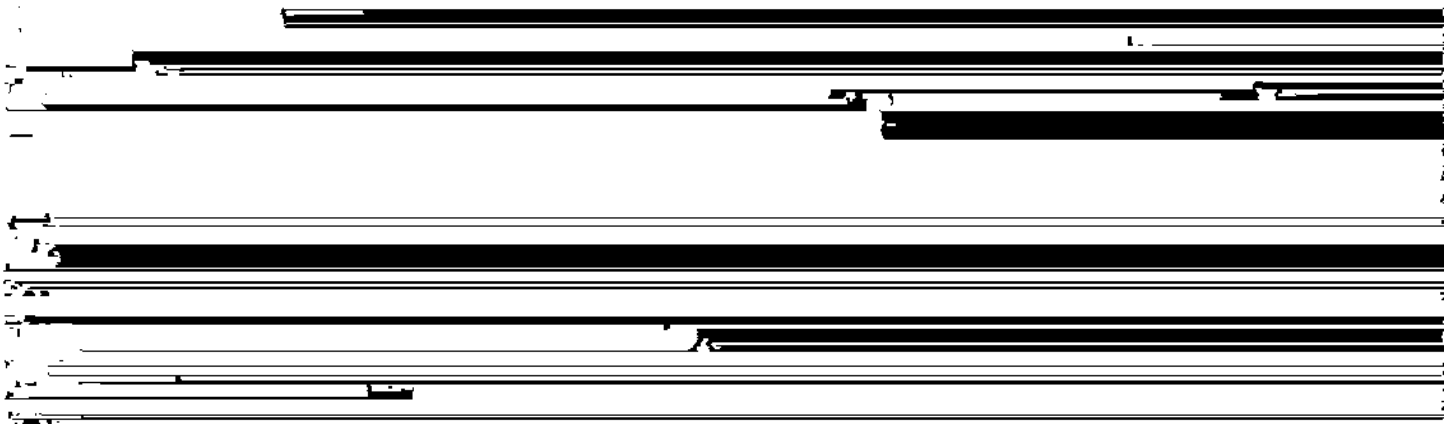
loam inclusion differs from this phase mainly in being uneroded or only slightly eroded and in having a reddish-brown friable surface soil about 11 inches thick. The other two inclusions differ in having clay loam surface soils, somewhat darker profiles, and parent materials that contain a larger quantity of weathered basic rock. All these soils are included because of small extent and generally similar management requirements. Also mapped with Lloyd sandy loam, eroded undulating phase, are small severely eroded areas, totaling about 39 acres, that have lost more than 75 percent of the surface soil. In cultivated areas of this inclusion, the plow layer consists of a mixture of the remaining surface soil and subsoil material and is a red to reddish-brown friable clay loam. These severely eroded areas are shown on the soil map by symbol.

Use and management (Group A–2).—Most of Lloyd sandy loam, eroded undulating phase, is cultivated, but some is in pasture. Small percentages are idle or in forest. Crops common in the county are grown. Variations of a corn-cotton-small grain-hay rotation are used by farmers getting the best yields. Where good management, including proper fertilization, is practiced, yields usually are medium to fairly high. The soil is easy to work. The moisture range suitable for cultivation, however, is somewhat narrower for this soil than for sandy Cecil soils. Nevertheless, the range is broader than for Davidson soils.

The soil is easily conserved, and it responds well to fertilization and other good management practices. Because of the smooth surface relief, the soil can be used in relatively short rotations and can be protected against erosion by simple methods. It is well suited to many kinds of crops, including corn, cotton, wheat, oats, rye, barley, alfalfa, crimson clover, lespedeza, soybeans, cowpeas, grasses, potatoes, and vegetables.

Lloyd sandy loam, rolling phase (6 to 10 percent slopes) (Lf).—This soil consists of well-drained to somewhat excessively drained areas on interstream ridges and on gradual slopes toward drainageways. The soil is not extensive. Erosion has affected it very little, if at all. The profile is relatively deep. The 9-inch surface soil is reddish-brown friable sandy loam. The 31-inch subsoil is red firm clay loam. The parent material varies in thickness and is a reddish-brown mixture derived from partly decayed basic and acidic rocks. Runoff is medium to rapid; erosion hazard is moderate to high. Internal drainage is medium.

Areas of Lloyd clay loam, rolling phase, totaling



soil is fairly easy to work and conserve. However, intensive methods of erosion control are needed. Crop rotations should be relatively long, and close-growing crops should occupy the land as much of the time as possible.

Lloyd sandy loam, eroded rolling phase (6 to 10 percent slopes) (Lg).—This phase has lost 25 to 75 percent of its surface soil through erosion. Except for the erosion losses, it is similar to the uneroded rolling phase. The remaining surface soil, about 3 to 8 inches thick, is reddish-brown friable sandy loam. In the thinner areas the plow layer is a mixture of surface soil and subsoil material and, as a result, is more clayey and less friable than in areas less eroded. The subsoil is red firm clay loam about 29 to 31 inches thick. It overlies a reddish-brown mixture of partly decomposed basic and acidic rocks. The soil has medium to rapid runoff and is moderately to highly susceptible to erosion. Internal drainage is medium.

Mapped with this soil is a total of about 672 acres of Lloyd clay loam, eroded rolling phase. The included soil differs principally in having a clay loam surface soil, a somewhat darker color, and a larger quantity of decomposed basic rock in its parent material. Largely because of its clay loam texture, the soil has a relatively narrow range of moisture content suitable for cultivation.

Use and management (Group A–1).—About half of Lloyd sandy loam, eroded rolling phase, is in cultivation and a third is in pasture. The rest is about equally divided between idle land and forest that is mainly pine. The common crops are grown. Yields are relatively low under prevailing management, but they can be increased by improved methods, among which are suitable rotation of crops and proper fertilization. The soil has good workability and fair conservability. Its use suitability and management requirements are similar to those of Lloyd sandy loam, eroded undulating phase. Because of its stronger slope, however, the soil has greater erosion control problems and needs longer rotations that include close-growing crops for longer periods. To control erosion and maintain fertility, farmers are terracing, stripcropping, contour plowing, using long rotations, and applying fertilizer in adequate amounts.

Lloyd sandy loam, hilly phase (10 to 15 percent slopes) (Lh).—This somewhat excessively drained soil occurs mainly on strong slopes near drainageways. Its profile is similar to that of Lloyd sandy loam, rolling phase, but its slopes are stronger and its surface soil and subsoil are generally thinner.

The 9-inch surface soil is reddish-brown friable sandy loam; the 30-inch subsoil is a red firm clay loam. The parent material varies in thickness and is a red-

centage of Lloyd sandy loam, hilly phase, is forested with mixed pines and hardwoods. Some is in pasture, and a small part is cultivated. Strong slopes, erosion hazard, and poor workability make this phase better suited to pasture and close-growing crops than to clean-cultivated crops. Where the soil must be cultivated, management should include use of rotations, provide a maximum of close-growing crops, terracing where feasible, stripcropping, contour plowing, and proper fertilization. These practices will help protect the soil against erosion and do much to maintain its fertility.

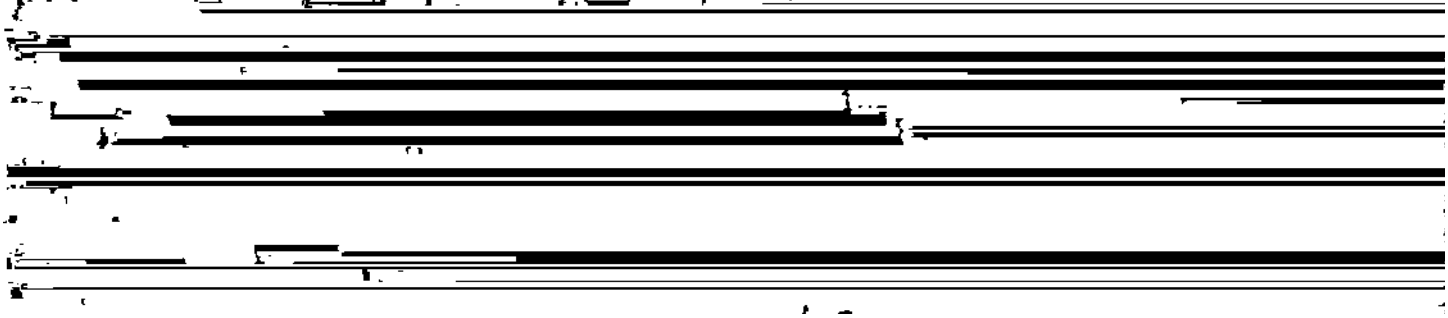
Lloyd sandy loam, eroded hilly phase (10 to 15 percent slopes) (Lk).—This soil consists of former areas of Lloyd sandy loam, hilly phase, that have been moderately eroded and therefore have lost 25 to 75 percent of the surface layer. The remaining surface soil is reddish-brown friable sandy loam about 2 to 7 inches thick. In the thinner cultivated areas, red subsoil material has been mixed with remnants of the surface layer, and as a result the plow layer is somewhat heavier by reason of the additional clay. The subsoil and parent material are similar to corresponding parts of the uneroded hilly phase.

Runoff is rapid, and the hazard of additional erosion is high. Internal drainage is medium. The soil has a fairly large total area.

Areas totaling about 194 acres of Lloyd clay loam, eroded hilly phase, are included with this soil because of the small acreage. The included soil differs mainly in having a heavier and somewhat darker surface layer and a larger proportion of decomposed basic rock in the parent material.

Use and management (Group B–3).—Lloyd sandy loam, eroded hilly phase, is mainly in crops and pasture, but some areas are forested and others are idle. It is fairly well suited to pasture, but strong slopes and erodibility make it poor or very poor for tilled crops. Productivity for crops and pasture is low to very low. Management requirements for erosion control and maintenance of fertility are the same as for Lloyd sandy loam, hilly phase.

Lloyd sandy loam, steep phase (15 to 25 percent slopes) (Lm).—This somewhat excessively drained to excessively drained soil occupies breaks or very strong slopes adjacent to drainageways. It is similar to Lloyd sandy loam, hilly phase. It differs mainly in having stronger slopes and a slightly thinner surface soil and subsoil. The reddish-brown friable surface soil is about 8 inches thick, and the red firm clay loam subsoil about 28. The parent material, a mixture of partly decomposed basic and acidic rocks, varies somewhat in thickness. This soil has rapid to very rapid runoff and high to very high erosion hazard. Internal drainage is



make the soil highly susceptible to erosion when cleared and difficult to manage for crops and pasture. It therefore is best used for trees.

Lloyd clay loam, severely eroded rolling phase (6 to 10 percent slopes) (La).—This somewhat excessively drained soil occurs on fairly smooth interstream ridges and gradual slopes leading toward drainageways. Most or all of the areas were originally Lloyd sandy loam, and all or nearly all of the sandy surface soil has been lost through erosion. The remaining part of the original surface soil has been mixed with upper subsoil material by cultivation, and the plow layer ranges from red to reddish brown.

Profile in an idle area once cultivated:

Surface soil—
0 to 5 inches, (plow depth) red to reddish-brown friable clay loam; weak fine crumb to medium blocky structure.

Subsoil—
5 to 34 inches, red firm clay loam; weak medium blocky structure.

and used for crops and pasture, but the soil is now mainly in second-growth pine forest. A small percentage is idle or in pasture. The soil is very difficult to work and difficult to conserve; it has very low productivity under prevailing management. It is generally unsuitable for crops and pasture because of strong slopes, poor physical qualities, low yields, and high susceptibility to further erosion. Its best use is for forest.

Lloyd clay loam, eroded steep phase (15 to 25 percent slopes) (Lc).—This soil occurs on very strong slopes or breaks adjacent to drainageways. It consists of areas, originally Lloyd sandy loam, that have been moderately to severely eroded. The eroded surface soil, 2 to 6 inches thick, is a reddish-brown friable clay loam. In some places, all of the surface soil has been lost. Where the surface soil is thinnest, it is red clay loam containing a relatively large quantity of subsoil material brought up by tillage. The subsoil, about 25 to 28 inches thick, and the parent material are about

9 acres are severely eroded and the rest are slightly to moderately eroded. The very steep areas are generally only slightly eroded, because they have remained

The surface soil ranges from 2 to 7 inches in thickness, and the subsoil from 22 to 25. In cultivated fields the color and texture of the plow layer vary according to

drainage is medium, and the moisture-holding capacity is moderate.

This complex is in the southern part of the county and is of local agricultural importance. Mapped with it are about 102 acres of Lockhart-Cecil clay loams, [illegible] bility is fair. Because of unfavorable characteristics, the complex is poorly suited to cultivated crops. It is, however, fairly well suited to pasture.

Lockhart-Cecil sandy loams, eroded hilly phases (10 to 15 percent slopes) (Lu).—This somewhat excessively [illegible]

in the plow layer by tillage, the surface soil is reddish-brown friable heavy sandy loam or clay loam. The subsoil is similar to that of Lockhart-Cecil sandy loams, hilly phases, but is not so thick. The parent material, variable in thickness, is similar to that in the complex of hilly phases.

The fertility of this complex is low. Runoff on the steep slopes is rapid to very rapid, and the soils are very susceptible to further erosion. Internal drainage is medium. The moisture-holding capacity is moderate. Permeability is moderately rapid to moderate conservability, and low to very low productivity. It is poorly suited to crops, largely because it has a narrow range of moisture content suitable for tillage, has low fertility, and needs intensive management for erosion control. If heavily fertilized and properly seeded, it is fairly well suited to pasture, but a satisfactory stand of desirable plants is hard to maintain.

Lockhart-Cecil clay loams, severely eroded hilly phases (10 to 15 percent slopes) (Lo).—This complex of somewhat excessively drained Lockhart and Cecil soils occupies strong slopes near or along drainage-

LOUISA SERIES

The Louisa soils characteristically are on very strong to strong upland slopes, but some areas occupy smooth narrow ridgetops. Drainage generally is somewhat excessive to excessive, although it is good in some places. The soils have formed through the decay of mica schist or quartz mica schist. Mica flakes are present throughout the entire profile, which is only moderately deep to the weathered rock. The Louisa soils are closely related to Madison soils in parent material but, in contrast, occupy steep choppy relief for the most part and nearly everywhere are shallower and have no true subsoil development.

The organic-matter content is usually low, and the soils are medium to strongly acid. Productivity for

in thickness and is composed of soft decomposed mica schist.

This eroded soil has rapid to very rapid runoff and is very susceptible to erosion. Internal drainage is medium to rapid.

Severely eroded areas totaling about 398 acres are mapped with this phase. These areas have lost most of their surface soil. They are included because they are relatively small and have essentially the same use suitability as the eroded steep phase.

Use and management (Group C–1).—Louisa fine sandy loam, eroded steep phase, is mainly in second-growth pines, but a small part is in pasture or idle. The soil has very poor workability and conservability and very low productivity for crops and pasture; it is

areas totaling about 65. These eroded areas are indicated on the soil map by symbol. Also included are about 9 acres of Louisa fine sandy loam, eroded undulating phase. This inclusion differs mainly in its slope

sandy loam, steep phase, is in forest made up of a mixture of pines and hardwoods. The rest is about equally divided as pasture and idle land. The soil has poor to very poor workability, very poor conservability, and

ternal drainage is medium to rapid, and the moisture-holding capacity is low. This soil occurs throughout the county.

For the most part, Louisburg sandy loam, rolling phase, is moderately eroded, but a few acres are severely eroded. Included is a total of about 23 acres having undulating relief (2 to 6 percent slopes) in

Profile in a less eroded cultivated area:

Surface soil—
0 to 7 inches, brown very friable fine sandy loam; weak fine crumb structure; considerable quantities of mica flakes and small mica schist fragments.

Subsoil—
7 to 24 inches, red friable clay loam; moderate medium crumb to fine blocky structure; many mica flakes

pend to a large extent on the level of soil management and range from medium to low. The soil is easily worked and conserved. Corn, cotton, wheat, oats, rye, barley, alfalfa, lespedeza, grasses, crimson clover, soybeans, and cowpeas are suited to this soil. Erosion should be controlled and fertility should be maintained. Good management practices include use of long rotations, stripcropping, contour plowing, terracing, and the addition of fertilizers.

Madison fine sandy loam, eroded rolling phase (6 to 10 percent slopes) (Mf).—This extensive soil is well drained to somewhat excessively drained. It occurs on broad fairly smooth interstream ridges and on gradual slopes toward drainageways. It consists of rolling areas of Madison fine sandy loam that have undergone moderate erosion and have lost 25 to 75 percent of the original surface soil. The remaining surface soil is about 2 to 6 inches thick. In the less eroded areas it is brown very friable sandy loam. In the more eroded areas where subsoil material has been mixed in by plowing, it is reddish-brown friable heavy fine sandy loam or light clay loam. The subsoil and parent material are practically the same as in Madison fine sandy loam, rolling phase. Many mica flakes and small mica schist fragments are present in the surface soil.

Runoff is medium to rapid, and the erosion hazard is

This soil has rapid runoff and somewhat excessive drainage. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The soil holds moisture well and has a moderate supply of organic matter.

Use and management (Group B–3).—The fairly small acreage of this soil is mainly in forest consisting of mixed pine and hardwoods. Some of the acreage, however, is in crops and pasture. Corn, lespedeza, and cotton are grown to some extent, but under common management yields are low or very low. Pasture or forest are the best use for this soil because of its hilly relief and erodibility. Pasture usually provides poor grazing under prevailing management. The soil has poor workability, and heavy machinery is difficult to use. Conservability is only fair, because the soil is susceptible to erosion. When demands of the farm are such that the soil must be kept in crops, terraces and stripcropping should be used. Long rotations with close-growing crops are necessary as much of the time as possible to maintain productivity and to control erosion. Proper amounts of fertilizer should be applied.

Madison fine sandy loam, eroded hilly phase (10 to 15 percent slopes) (Mh).—This soil consists of areas that have been eroded to a moderate degree. They occur on short strong slopes near or along drainageways. From 25 to 75 percent of the original surface

phase, totaling about 230 acres—areas too small to be shown separately on the map—are mapped with this soil. Also included are about 49 acres that have slopes of more than 25 percent.

Use and management (Group C–1).—Nearly all of the relatively small acreage of Madison fine sandy loam, steep phase, is covered with pine-and-hardwood forest. This soil is difficult to very difficult to work and to conserve, principally because of its very strong slopes. Productivity is very low. The soil is suitable only for forest.

Madison gravelly sandy loam, rolling phase (6 to 10 percent slopes) [MlB].—This friable, well drained to somewhat excessively drained, reddish soil occurs on fairly smooth interstream ridges and moderate slopes descending toward drainageways. Numerous mica sandy loam, rolling phase. The remaining sandy surface soil, about 2 to 6 inches thick, is brown very friable gravelly sandy loam. In the more eroded cultivated areas the surface soil has been mixed with red subsoil material to plow depth, and the result is a reddish-brown friable heavy gravelly sandy loam or light clay loam.

This soil has medium to rapid runoff, and the erosion hazard is moderate to high. The surface soil is moderately to rapidly permeable, and the subsoil is moderately permeable. The soil is medium acid.

Some areas are severely eroded but are included because of their small aggregate areas—about 432 acres. Most of the original gravelly sandy loam surface soil has been lost. In cultivated areas the remaining surface soil has been mixed with upper subsoil

the pasture and the few crops grown. The soil has poor workability and a narrow range of moisture content suitable for cultivation. Because of severe erosion and other unfavorable features, the soil can be used for deep-rooted perennial legumes or trees.

Madison clay loam, severely eroded hilly phase (10 to 15 percent slopes) (Mc).—This soil consists of eroded areas on strong short slopes near or adjacent to drainageways. These areas were originally Madison fine sandy loam, hilly phase, but practically all or all the original brown sandy surface layer has been lost. The soil has a relatively small total acreage, and the areas are generally associated with the other hilly Madison soils. Practically all areas were once cleared for cultivation.

To plow depth the soil is red to reddish-brown friable clay loam. The subsoil, about 21 to 23 inches thick, is red friable clay loam. A large quantity of mica flakes occurs in the lower part. The parent material varies in thickness and consists of yellowish-red, soft, decomposed mica schist.

The fertility of this soil is low. Runoff is high, and internal drainage is medium. The hazard of erosion is high, but soil permeability and moisture-holding capacity are moderate.

In some areas, totaling about 155 acres, the slopes are steep, ranging between 15 and 25 percent. For the most part, however, this included soil is similar to the severely eroded hilly phase. It is included because of small extent and similar use suitability.

Use and management (Group C–1).—About half of Madison clay loam, severely eroded hilly phase, is in forest consisting almost entirely of second-growth pine. Most of the rest is idle, but some areas are in pasture, and some are cultivated. The soil has very poor workability, poor conservability, and very low productivity. These unfavorable features and the impracticability of controlling erosion restrict the use of this soil principally to forest.

Madison-Grover-Louisa gravelly sandy loams, hilly phases (10 to 15 percent slopes) (Mo).—This is a complex of Madison, Grover, and Louisa soils that occupies strong slopes near or next to drainageways. The areas of each soil are too small or too intricately associated to be separated on the soil map. The Grover soil is lighter colored than the Madison. The Louisa has a reddish color somewhat like that of the Madison but is more micaceous and shallower and has no true subsoil. The small rock fragments that make the soils gravelly are mainly mica schist. The strong relief and erodibility limit use largely to pasture and forest.

In the Madison soil areas, the surface soil is brown very friable gravelly sandy loam about 9 inches thick. The subsoil, about 26 inches thick, is red friable clay loam that contains many mica flakes. The parent material is yellowish-red, soft, decomposed micaceous rock.

The areas of Grover soil have a light olive-yellow friable gravelly sandy loam surface soil about 10 inches thick, a reddish-yellow to brownish yellow friable sandy clay loam subsoil, and a brownish-yellow parent material of partly decayed micaceous rock.

In the Louisa soil areas the surface soil, 5 to 6 inches thick, is brown very friable gravelly sandy loam containing much mica. The subsurface layer is yellowish-red, soft, very friable micaceous sandy loam about 19 inches thick. The parent material is composed of yellowish-red, soft, decayed mica schist rock.

The soils of this complex are low in fertility, medium to strongly acid, and moderate to low in organic-matter content. They have rapid runoff and are highly susceptible to erosion. Their permeability is moderately rapid to moderate in the surface soil and moderate in the subsoil. The moisture-holding capacity is moderate to very low.

Use and management (Group B–3).—The small aggregate area of Madison-Grover-Louisa gravelly sandy loams, hilly phases, is mainly in pine-and-hardwood forest. Small percentages are in cultivated crops and in pasture. Corn, lespedeza, and cotton are grown, but under the management practiced the yields are very low. Pasture is poor under the usual management.

The soil has poor workability and fair to poor conservability. It has a narrow to very narrow suitability range and is best for pasture or forest. If areas must be used for crops, practices for controlling erosion and maintaining productivity include terracing, stripcropping, and use of long rotations that keep close-growing crops on the soil most of the time. Adequate fertilization is also needed.

Madison-Grover-Louisa gravelly sandy loams, eroded hilly phases (10 to 15 percent slopes) (Mp).—This complex consists of former areas of Madison-Grover-Louisa gravelly sandy loams, hilly phases, that have lost 25 to 75 percent of the original surface soil through erosion.

In the Madison soil areas, the remaining surface soil, about 2 to 5 inches thick, is brown very friable gravelly sandy loam. However, where erosion has carried away most of the original surface layer, the soil to plow depth contains subsoil material mixed in by tillage and is reddish-brown very friable gravelly heavy sandy loam or gravelly light clay loam.

In the Grover areas, the remaining surface soil, about 3 to 8 inches thick, is light olive-yellow friable sandy loam. In the more eroded areas some reddish-yellow subsoil material has been mixed in by tillage.

In the Louisa area, the remaining surface soil, about 2 to 4 inches thick, is brown very friable gravelly micaceous sandy loam, but where underlying material has been mixed with surface soil by tillage, the plow layer is reddish brown.

The other profile layers of the three soils are similar to corresponding layers in the complex of uneroded hilly phases.

In these eroded hilly phases fertility, runoff, erosion hazard, permeability, moisture-holding capacity, and reaction are practically the same as in the uneroded hilly phases. The organic-matter content ranges from moderate to low.

Use and management (Group B–3).—Madison-Grover-Louisa gravelly sandy loams, eroded hilly phases, are about twice as extensive as the uneroded hilly phases. About half the total area is in forest consisting mostly of pines. The rest is mainly idle or in pasture. A small percentage, however, is in crops, usually corn, lespedeza, and cotton. Under prevailing management, crop and pasture yields are low to very

low. The soils are difficult to work and to conserve. Their unfavorable characteristics limit their use largely to pasture and forest. If these soils are used for crops, the management requirements for control of erosion and maintenance of fertility are the same as given for Madison-Grover-Louisa gravelly sandy loams, hilly phases.

Madison-Grover-Louisa gravelly sandy loams, steep phases (15 to 25 percent slopes) (Mr).—This complex occupies breaks or short very strong slopes adjacent to drainageways. It differs from Madison-Grover-Louisa gravelly sandy loams, hilly phases, principally in having stronger slopes and generally slightly thinner profile layers.

Runoff is rapid to very rapid, and natural drainage is somewhat excessive to excessive. The erosion hazard is high to very high, and the moisture-holding capacity is moderate to very low. The supply of organic matter is moderate to low, and the reaction is medium to strongly acid.

Small areas of Madison-Grover-Louisa gravelly sandy loams, eroded steep phases, totaling about 149 acres, are included with this complex as mapped. They differ mainly in having lost 25 to 75 percent of the surface soil. Included also are small areas, totaling about 171 acres, that have lost nearly all or all the surface soil as a result of severe erosion. These areas are indicated on the soil map by symbol.

Use and management (Group C–1).—Almost all the small aggregate area of Madison-Grover-Louisa gravelly sandy loams, steep phases, is in pine-hardwood forest. Pasture and idle land occupy about 5 percent each. Workability and conservability of the soils are poor to very poor, and productivity is very low. The steep slopes and great risk of erosion when areas are cleared restrict use of these soils almost wholly to forest.

Madison-Grover-Louisa gravelly clay loams, severely eroded hilly phases (10 to 15 percent slopes) (Mn).—This complex is made up of hilly areas, originally Madison-Grover-Louisa gravelly sandy loams, that have been so eroded that very little or none of the original surface soil remains. In areas once cultivated, the plow layer of the Madison soil is red to reddish-brown friable gravelly clay loam; that of the Grover soil, light olive-yellow to reddish-yellow friable gravelly clay loam; and that of the Louisa soil, reddish-brown to yellowish-red very friable micaceous gravelly sandy loam. The other profile layers of these soils are similar to the respective layers in the complex of uneroded hilly phases. The gravel present in the soils is mostly composed of small mica schist fragments. Many shallow gullies have formed.

The soils are low in fertility and organic matter and are medium to strongly acid. Runoff is rapid, and the erosion hazard is high. The moisture-holding capacity is moderate to very low.

Use and management (Group C–1).—Almost all of the relatively small acreage of Madison-Grover-Louisa gravelly clay loams, severely eroded hilly phases, is in second-growth pine forest. This complex of soils has very poor workability, poor to very poor conservability, and very low productivity. Largely because of the strong slopes and severe erosion, it is best used for forest.

MECKLENBURG SERIES

The Mecklenburg soils are on uplands. They range from fairly smooth interstream ridges down to strong slopes near or adjacent to drainageways. Relief is rolling to hilly; drainage is moderately good. The soils have formed from materials weathered from dark-colored basic rocks, mainly diorite. Because of similarity in parent material, they are closely related to Davidson and Iredell soils. They are intermediate between them in color and consistence, particularly in color and consistence of the subsoil. In most places small fragments of the parent rock strewn over surface and mixed in the surface soil make the texture gravelly.

The soils are deep to moderately deep; they have a moderate to low organic-matter content and are slightly acid. Productivity for crops and pasture is low to very low.

Mecklenburg gravelly sandy loam, eroded rolling phase (6 to 10 percent slopes) (Mf).—This soil is characterized by a brown gravelly surface soil and a reddish-brown to yellow firm clay subsoil, somewhat mottled with other colors. The soil areas are small and their total acreage is very small.

Profile in a less eroded cultivated area:

Surface soil—
0 to 6 inches, dark grayish-brown friable sandy loam; small fragments of diorite rock make up about 20 percent of the soil mass; weak fine-crumb structure.

Subsoil—
6 to 16 inches, reddish-brown firm clay; a few faint medium mottles of brown and red; moderate medium blocky structure; plastic and sticky when wet; some ironstone concretions.
16 to 41 inches, yellow firm clay; moderate number of distinct medium mottles of olive yellow; moderate coarse blocky structure; plastic and sticky when wet; some weathered rock fragments.

Parent material—
41 inches +, light olive-gray to olive, soft, decayed diorite rock.

The thickness of the surface soil varies from about 3 to 7 inches, but in a few less eroded areas it may be as much as 10 inches. In cultivated fields where subsoil material has been mixed with surface soil, the plow layer is reddish-brown friable gravelly sandy loam to heavy sandy loam. The thickness of the subsoil ranges from about 33 to 35 inches.

This soil is moderate in fertility and retains its supply of plant nutrients moderately well. It usually has a moderate organic-matter content in the less eroded areas, but a low content in the more eroded areas. Runoff is medium to rapid, and internal drainage is slow because of the heavy consistence of the subsoil. Permeability of the surface soil is moderate to slow.

About 20 acres that have undulating relief (2 to 6 percent slopes) are included with this soil. Areas totaling about 9 acres that have lost practically all of the original surface layer are also included. The included soils are too small to be shown separately on the map.

Use and management (Group A–1).—Most of Mecklenburg gravelly sandy loam, eroded rolling phase, is in crops and pasture. Some areas are idle and some are in forest. Corn and cotton are the chief crops. Corn receives a complete fertilizer at planting

time and is sidedressed with nitrogenous fertilizer when the crop is about 40 days old. Cotton is also given a complete fertilizer at planting time and a nitrogenous side dressing when it is chopped. Cotton matures later on this soil than on the better areas, and, consequently, is subject to greater damage by boll weevils. Yields of corn and cotton range from low to medium, depending largely on the kind of management the soil has received.

The soil has poor workability, and the range of moisture content that will allow cultivation without clodding is somewhat narrow. The soil is moderately to highly susceptible to erosion, and the control of runoff and maintenance of fertility require much care. The effects of turning under green-manure crops or of applying barnyard manure are lasting, because the heavy subsoil holds the plant nutrients and prevents

was formed as a result of soil-material accumulation rather than soil-development processes. It consists of different soil areas that are so small, so intimately mixed, and so variable in color, texture, and consistence that it is impractical to separate them on the soil map. In some places small bodies of Congaree, Starr, and Seneca soils are interspersed among areas of this mixed alluvium.

Mixed alluvium, well drained, ranges in composition from friable heavy silt loam to loose sand. Usually the sandy layers are nearest the surface and the heavier, finer textured material is in layers at lower depths. Because of great variability in the organic-matter content, the color ranges from light gray to dark gray.

This land type covers relatively large acreage along some of the streams. Its fertility is moderate. It has

large as that of the well-drained Mixed alluvium. Drainage for crops and pasture is impractical in most places.

Use and management (Group B–2).—A large percentage of Mixed alluvium, poorly drained, is in forest. Smaller percentages are in pasture or are idle. The trees in the forested areas are almost entirely alders and willows. Small vegetation consists principally of reeds and marshgrasses. If adequately drained, the land is suitable for pasture. Because of the difficulty of obtaining good drainage, however, most of it should be kept in forest.

MOLENA SERIES

The soils of the Molena series are on high stream terraces that are apparently very old. They formed in old alluvium derived from uplands underlain principally by granite and gneiss, but in places by basic rock. They are associated with the Hiwassee soils and have a profile of similar color. Molena soils, however, have a very friable porous sandy profile that is fairly low in clay content and shows only slight differences in consistence and structure throughout its entire depth.

The relief is largely undulating but ranges from undulating to hilly. The somewhat excessive to excessive drainage of the Molena series is caused largely by the open sandy consistency. In places the profile varies considerably from the usual red color. A variant having a profile of lighter color therefore is recognized and mapped.

The organic-matter content of the series is low, and the reaction is slightly to medium acid. Productivity for crops and pasture is low to very low.

Molena loamy sand, eroded undulating phase (2 to 6 percent slopes) (My).—Superficially this soil has the appearance of the associated Hiwassee soils, but it is sandy throughout, whereas the well-developed Hiwassee soils have a friable clay loam subsoil that retains organic matter and applied plant nutrients. It is very small in extent and occurs mainly on high terraces along the Chattahoochee River.

Profile characteristics in a cultivated area:

Surface soil—
- 0 to 12 inches, brown very friable loamy sand; structureless.
- 12 to 24 inches, yellowish-red very friable loamy sand; structureless.

Subsurface—
- 24 to 36 inches, red very friable sandy loam; very weak medium-granular structure.
- 36 to 45 inches, red very friable sandy loam; structureless.

Underlying material—
- 45 inches +, friable old alluvial material of sand and loamy sand.

The profile layers vary somewhat in thickness from place to place.

This soil is low in fertility and slightly acid. Runoff is slow to medium, and internal drainage is rapid. The soil is very permeable to roots, moisture, and air and has a low capacity for retaining moisture and applied plant nutrients.

About 20 acres of rolling areas (6 to 10 percent slopes) are too small to justify separation on the soil map and are included with this soil.

Use and management (Group C–1).—Nearly all of Molena loamy sand, eroded undulating phase, is cleared. About half of it is in crops and pasture. The rest is idle or in forest. Cotton, corn, and small grains are the chief crops. Watermelons, peanuts, sweetpotatoes, and cowpeas are suitable if properly fertilized. Yields range from low to medium; they vary according to the amount of rainfall during the growing season.

The soil is very easy to work and can be worked within a wide range of moisture content. Conservability, especially of plant nutrients, is only fair. The soil, however, like many other sandy soils, responds readily to fertilization. Because it does not hold moisture or applied plant nutrients well and tends to dry out, this soil is poorly suited to crops and pasture. It is very good for growing stolons of coastal bermudagrass if ample fertilizer and water are applied.

Molena loamy sand, light colored variant (2 to 10 percent slopes) (Mx).—This soil is associated with Hiwassee soils and Molena loamy sand, undulating phase, and is somewhat excessively drained. It is distinctly sandier than the Hiwassee soils, especially in its subsurface layers, and is lighter colored than the Hiwassee and the associated Molena soil. It has formed from materials washed from Cecil, Madison, and Appling soils. The soil has mainly rolling relief, but about 25 percent is undulating and a few acres are hilly. It occurs mostly along the Chattahoochee River, and its total extent is very small.

Profile in a cultivated area:

Surface soil—
- 0 to 4 inches, yellowish-brown very friable loamy sand; structureless.
- 4 to 12 inches, yellowish-brown very friable sandy loam; very weak fine crumb structure.

Subsurface—
- 12 to 30 inches, yellowish-brown friable fine sandy loam; weak fine crumb structure; more fine-textured material than in the layers above.
- 30 to 40 inches, brownish-yellow friable fine sandy loam; red distinct medium mottles in moderate numbers; weak fine crumb structure; small quantities of coarse sand and fine gravel.

Underlying material—
- 40 inches +, brownish-yellow friable sandy loam of old alluvial material; moderate number of red, distinct, coarse mottles; some fine gravel.

Minor variations occur in the color, texture, and thickness of the profile layers.

This soil is low in fertility and medium acid. Runoff is slow to rapid, and internal drainage is rapid. Permeability through the surface soil is rapid; through the subsurface layers, moderately rapid. The moisture-holding capacity is moderately low, but the capacity of the soil to retain applied plant nutrients is fairly good.

Included with this soil as mapped are about 2 acres of light-gray loamy fine sand. The soil is lighter colored and sandier throughout the profile. It is included because it is not large enough to be shown separately on the map.

Use and management (Group A–2).—About half of Molena loamy sand, light colored variant, is in crops

of crop suitability is similar to that of Molena loamy sand, eroded undulating phase.

Corn, cotton, and small grains are the principal crops. Yields depend on the soil management and the abundance of rainfall during the growing season; they range from low to medium. Cotton and corn receive a mixed fertilizer and, after they have made some growth, a side dressing of nitrogen fertilizer. Small grains are also given a mixed fertilizer and later on a topdressing of nitrogen fertilizer. If the small grain follows a heavily fertilized crop, only the topdressing is applied.

Molena loamy sand, light colored variant, is physically suited to many crops, but its tendency toward droughtiness often restricts yields. It quickly responds to applications of fertilizer. Deep-rooted crops should do fairly well in summer and early in fall, but [illegible] receive a more favorable

Profile in a cultivated area:

Surface soil—
0 to 18 inches, dark grayish-brown very friable fine sandy loam; very weak fine crumb structure.

Subsurface—
18 to 30 inches, grayish-brown friable fine sandy loam; very weak fine crumb structure.

Underlying material—
30 inches +, friable colluvial material of sand, silt, and clay.

The profile layers vary to some extent in color, texture, and thickness.

This soil is generally low in fertility. Runoff is medium to slow, and internal drainage is medium. Permeability is moderately rapid in the surface soil and moderate in the subsurface layer. The moisture-holding capacity is good.

Included with this phase are about 6 acres where the [illegible]

Cecil, and Madison. Their profile shows very little difference in color, texture, and consistence from the surface downward. In nearly all areas there is no evidence of true subsoil development.

The organic-matter content is generally moderate, and the soils are slightly acid to medium acid. Productivity is generally high.

Starr loam, undulating phase (2 to 6 percent slopes) (Sd).—In occurrence and formation, this soil is similar to Seneca fine sandy loam, undulating phase; but it is darker, is less sandy and less leached, and contains more organic matter. The soil occurs throughout the county and is relatively small in total extent.

Profile in a cultivated area:

Surface soil—
0 to 20 inches, yellowish-red friable loam; very weak fine crumb structure.
Subsurface—
20 to 30 inches, yellowish-red friable heavy loam; weak fine crumb structure.
30 to 35 inches, yellowish-red friable loam; light-gray distinct medium mottles are common; very weak fine crumb structure.
Underlying material—
35 inches +, friable colluvial material of sand, silt, and clay.

The layers of the profile vary somewhat in color, texture, and thickness from place to place.

The soil is comparatively high in fertility. It has medium to slow runoff and medium internal drainage. It is moderately permeable to roots, moisture, and air and has good moisture-holding capacity.

Use and management (Group A–2).—This soil is largely in crops and pasture. Some areas are idle and some are in forest. The soil is used for about the same crops and managed in about the same way as the associated Lloyd, Davidson, Cecil, and Madison soils. Productivity is high.

This soil is easily worked and conserved, and its productivity is fairly easily maintained. It is well suited to many crops, including corn, cotton, wheat, oats, rye, barley, crimson clover, alfalfa, cowpeas, soybeans, lespedeza, grasses, potatoes, melons, and vegetables.

Starr loam, level phase (0 to 2 percent slopes) (Sc).—This soil differs from Starr loam, undulating phase, principally in occupying level or nearly level areas. The areas of this phase are generally small and occur throughout the county.

The fertility of this soil is generally high. Runoff is slow and internal drainage is medium. Permeability and moisture-holding capacity are moderate.

Use and management (Group A–2).—Crops and pasture are the principal uses for this soil. Some areas are in forest and some are idle. The soil is farmed with the associated Lloyd, Davidson, Cecil, and Madison soils and is managed similarly. Workability and conservability are good, and productivity generally is high. Crops grown on the undulating phase are well-suited to this soil.

STONY LAND

Stony land, rolling (6 to 10 percent slopes) (Se).—This miscellaneous land type occupies areas in which outcropping bedrock occupies 10 to 50 percent of the surface. Many large boulders also occur. In most places the soil or soil material among the rocks is similar to that of Cecil or Lockhart soil. Where a soil mantle occurs, bedrock lies at depths of a few inches to several feet. Where the bedrock is near the surface, only a gray to yellowish-brown sandy surface soil has formed, but where it is at a greater depth the surface soil is underlain by yellowish-brown to red friable clayey soil material.

This miscellaneous land type is medium to strongly acid, low in organic matter in most places, and low in fertility. Runoff is medium to rapid, and the erosion hazard is moderate to great. Internal drainage, where established, is medium. Permeability is moderately rapid to moderate, and moisture-holding capacity in the deeper parts is moderate.

In a few areas, totaling about 27 acres, the relief is undulating (2 to 6 percent slopes). These areas are included because of their small extent and similar use suitability.

Use and management (Group C–1).—All the very small aggregate area of Stony land, rolling, is in forest consisting of a sparse stand of mixed pine and hardwoods. Stoniness, very poor workability and conservability, and low to very low productivity make this land type unsuited to crops and poorly suited to pasture. For the most part it is best used for trees.

Stony land, hilly (10 to 15 percent slopes) (Sf).—This miscellaneous land type differs from Stony land, rolling, principally in having stronger slopes. It has about the same percentage of rock outcrops and the same type of boulders, but in some places the soil surrounding the rocks may be a little shallower.

This land type is low in fertility and low in organic matter in most places. It is medium to strongly acid. Runoff is rapid, and internal drainage, where soil characteristics are favorable, is medium. The erosion hazard is high. Nearly half the aggregate area has been severely eroded, and a small part has been moderately eroded. Permeability is moderately rapid to moderate. In the deeper areas the water-holding capacity is moderate.

Use and management (Group C–1).—Stony land, hilly, occupies short strong slopes near or along drainageways. It is more extensive than Stony land, rolling, and all of it is in forest of mixed pines and hardwoods. Stoniness, very poor workability and conservability, and very low productivity make this hilly land unsuitable for crops and poorly suited to pasture. In practically all places its most feasible use is for forest.

Stony land, steep (15 to 25 percent slopes) (Sg).—In stoniness and character of soil material this miscellaneous land type is similar to Stony land, rolling, but it has stronger slopes. In general, the soil material among the rock outcrops and the large boulders is somewhat shallow. The outcrops and boulders cover about the same percentage of the surface as on the rolling Stony land. The areas of this steep land are on short, very strong slopes adjacent to drainageways.

This land type is low in fertility and in most places low in organic-matter content. It is medium to strongly acid. Runoff is rapid to very rapid, and the erosion hazard is high to very high. Internal drainage in the deeper soil areas between the rocks is medium.

Permeability is moderately rapid to moderate. In the deeper areas the soil retains moisture fairly well.

Although this stony land is prevailingly steep, it includes a total of about 194 acres in which the slopes are very steep, or more than 25 percent. These steeper areas make up only a relatively small part of the total and are included because their use suitability is similar to that of the less steep areas.

Use and management (Group C–1).—The relatively small aggregate area of Stony land, steep, is in forest consisting of a scant mixed stand of pines and hardwoods. This land is not suitable for crops or pasture because of its very strong slopes, high susceptibility to erosion, very poor workability, and very low productivity. It is best used for forest.

UNCLASSIFIED CITY LAND

Unclassified city land (Ua).—This land type occupies a relatively large part of Fulton County. It includes areas within and adjacent to cities (principally Atlanta). It is so altered or obscured by urban works and structures that identifying and mapping the soils is not feasible or would be of no value to the agriculture of the county. Group C–1.

WEHADKEE SERIES

The Wehadkee soils, located on low first bottoms subject to periodic overflow, are poorly drained. They are relatively deep, but the water table is usually high. They are associated with Congaree and Chewacla soils but are unlike them in being mottled throughout their entire depth. Other than color differences, their profile shows very little change from the surface downward.

The soils have a low organic-matter content.

Most of the land cannot be used for cultivated crops because of poor drainage, and in most places adequate drainage is difficult to obtain by artificial means. Productivity for pasture generally is low.

Wehadkee silt loam (0 to 2 percent slopes) (Wb).—This soil has formed from young alluvium consisting of material washed from upland soils. New alluvial material is added in places by floodwaters. Runoff is slow to very slow. In places drainage is so poor that the soil is semiswampy. Erosion is not a factor except possibly for some stream scouring in places during high water. Because of poor drainage, this soil has a narrower use range and lower productivity than the associated Congaree and Chewacla soils.

The profile layers vary a little in thickness from place to place. The textures also vary, and layers of different alluvial material occur at various depths, especially in the lower part of the profile. The soil is friable when moist but is hard and cloddy when dry.

This soil has comparatively high fertility, but it is poorly supplied with organic matter. It is medium acid throughout the entire profile. Permeability is slow in the surface soil and very slow in the subsurface. The moisture-holding capacity is very high.

Mapped with this soil are about 565 acres of Wehadkee very fine sandy loam, which differs principally in texture. This very fine sandy loam is included because of only slight difference in texture and similar use suitability.

Use and management (Group B–2).—More than half of Wehadkee silt loam is in forest. The trees are chiefly alder, blackgum, and willow, and the undergrowth is mostly reeds and coarse marshgrasses. Pasture is generally confined to the better drained areas. Some of the soil is idle and a small percentage is tilled.

Poor drainage, very poor workability, low productivity, and other unfavorable features limit the use of this soil for crops. Late summer crops can be grown in the better drained places. In areas where adequate drainage can be obtained, corn does fairly well. The better drained areas and those that can be improved by artificial drainage, if properly seeded and otherwise well managed, are moderately well suited to pasture. Even in such places, coarse water-loving grasses that have low grazing value are likely to replace the more desirable pasture plants. Deepening and widening the channels of smaller streams, where practicable, would be necessary to obtain adequate drainage. Suitable engineering improvements along the larger streams would also improve drainage.

Wehadkee fine sandy loam (0 to 2 percent slopes) (We).—This soil differs from Wehadkee silt loam principally in containing more sand and in having a coarser texture throughout its profile.

The 12-inch surface soil is an olive-gray friable fine sandy loam, mottled with brown. The subsurface layer is about 26 inches thick. In the upper 9 inches it is a light brownish-gray friable fine sandy loam, mottled with brown and gray, but in the lower 17 inches it is a gray friable fine sandy loam mottled with yellow and brown. The surface soil and subsurface layer vary a little in texture, color, and thickness from place to place. The material underlying the subsurface layer is mottled friable alluvium composed largely of sand, silt, and clay.

in pasture. Only a small percentage is cultivated. Alder, blackgum, and willow are the principal trees. The undergrowth is mainly reeds and coarse marshgrasses.

This soil has poor workability, good conservability, and low productivity. Because of unfavorable features, particularly poor drainage, it has a narrow range of suitability. Some of the better drained areas

Mapped with this soil are about 59 acres of Wickham fine sandy loam, level phase (0 to 2 percent slopes), and about 10 acres of Wickham fine sandy loam, rolling phase (6 to 10 percent slopes). These soils were included because of their small extent, similar profile characteristics, and need for generally similar use and management. About 116 acres of Wickham silt loam, ranging from level to undulating,

Use and management (Group A–2).—A large part of Wickham fine sandy loam, eroded undulating phase, is cultivated. Some, however, is in pasture, and small parts are idle and in forest. This soil has very good workability, good conservability, and medium productivity. The use suitability and management requirements of this soil are practically the same as those of Wickham fine sandy loam, undulating phase, but in places more intensive management practices are needed to control erosion.

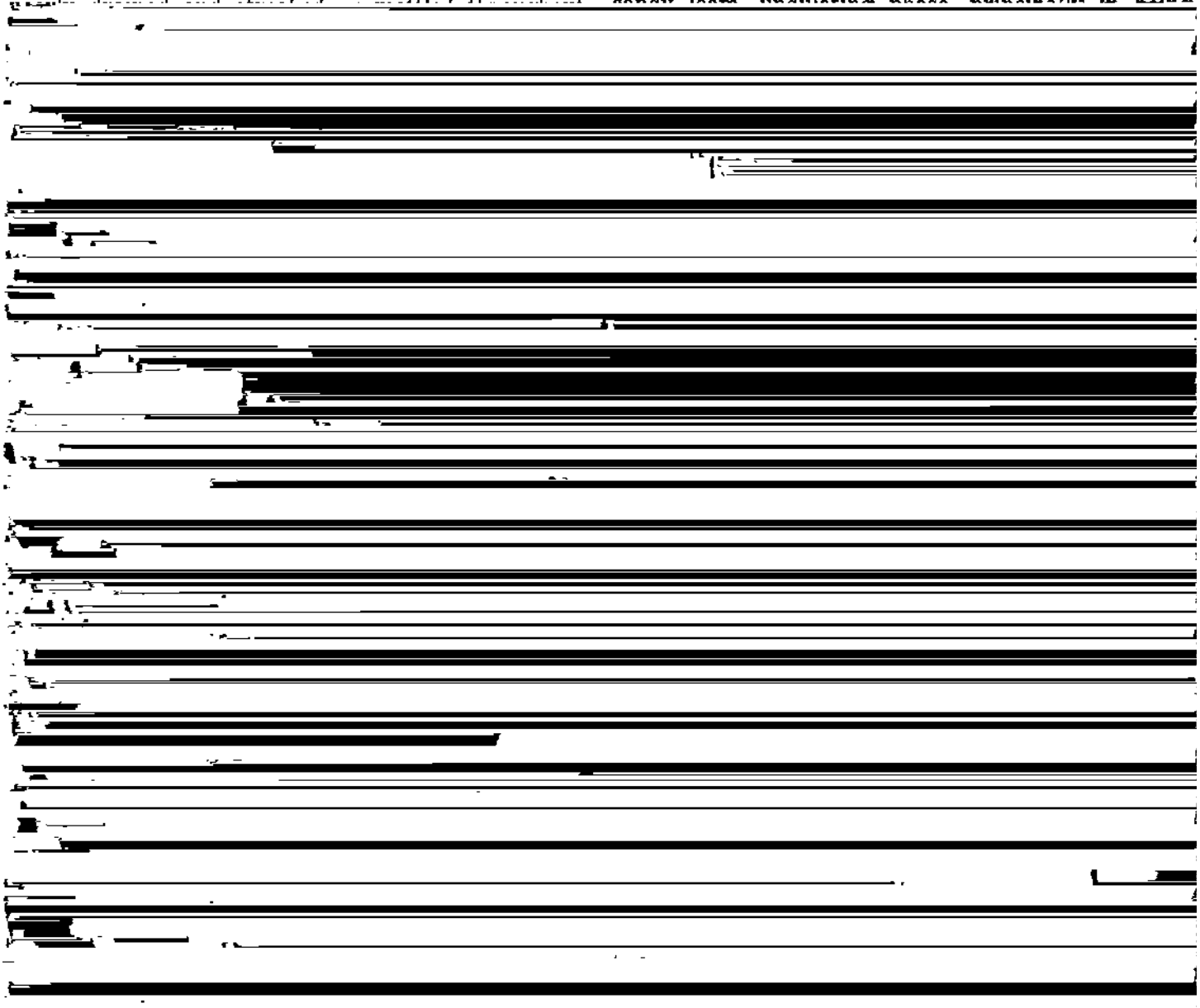
WORSHAM SERIES

The soils of the Worsham series occupy seepy places on lower upland slopes, around drainage heads, and along drainageways. For the most part these soils have formed in colluvium derived from Appling and Cecil soils on the adjacent slopes. They differ from these soils in having a lighter colored profile and a heavy claypan subsoil that retards internal drainage. They are similar to Seneca and Starr soils in mode of occurrence and formation, but they differ in being [illegible] and the slopes are 2 percent or less. These nearly level areas are included because of their relatively small extent and similar use suitability.

Use and management (Group B–4).—More than half of Worsham sandy loam, undulating phase, is in forest. Some is in crops and pasture and a small percentage is idle. Corn is planted on small areas. Corn yields are usually very low under prevailing management but are affected by the amount of rainfall during the growing season.

This soil is fairly difficult to work, but it is easy to conserve. Mainly because of its poor workability and unfavorable drainage, the soil is poorly suited to tilled crops. Even with the establishment of adequate drainage, the soil would not be well suited to corn, wheat, oats, rye, and other crops common in the county. It is suitable, however, for pasture grasses in summer when moisture conditions are favorable. Satisfactory pasture can be grown if the management, including seeding, is good.

Worsham sandy loam, eroded undulating phase (2 to 6 percent slopes) (Wf).—This soil differs from Worsham [illegible]



loam. It varies in color and texture according to the quantity of subsoil material mixed in by plowing. The subsoil, about 26 to 28 inches thick, consists of light-gray, streaked with yellow, heavy sandy clay. In the bottom 6 inches the subsoil is white heavy sandy

year to clean-cultivated crops—principally cotton and corn—or in a very short rotation without taking proper measures to maintain fertility or to control erosion.

Some soils now producing tilled crops are not suited

years. Under common management average corn yields range from 10 to 20 bushels an acre, depending on the soil, but under good management average yields range from 30 to 40 bushels. The response of other crops to good management is somewhat similar to that of corn.

The soils of this management group are suited to all crops commonly grown in the county. The main management problems are erosion control and the increase and maintenance of fertility. Good practices to use for controlling erosion include contour tillage, terracing, and stripcropping.

For all soils of group A–1 except that of the Davidson series, the range of moisture content suitable for cultivation is moderate. For the Davidson soil, the range is relatively narrow, and the soil tends to become cloddy if cultivated when too wet or too dry. Cotton is reported to be more subject to boll-weevil infestation on this soil than on the other soils of the group.

The soils of group A–1 are well suited to pasture. If they are kept fertile, they will support a good growth of bermudagrass, orchardgrass, Dallisgrass, tall fescue, ryegrass; white, Ladino, crimson, and hop clovers; and lespedeza. In general, phosphorus and lime are the chief soil amendments needed. Nitrogen is needed for all grasses.

Madison fine sandy loam, eroded undulating phase.
Molena loamy sand, light colored variant.
Starr loam, level phase.
Starr loam, undulating phase.
Wickham fine sandy loam, eroded undulating phase.
Wickham fine sandy loam, undulating phase.

Use and management.—The soils in management group A–2 are used largely for crops and pasture. All the major crops in the county are grown, and on the better farms fertilization is about the same as for soils of group A–1. Farmers, however, tend to use shorter rotations on the soils of group A–2 and to alternate clean-cultivated crops instead of using systematic crop rotations.

The principal management problems on soils of group A–2 are the building up and maintaining of soil fertility. Erosion is easier to control on these soils than on those of group A–1. The soils of group A–2 are suitable for all the crops grown in the county, as well as for pasture. They can be used fairly intensively. When they are kept highly fertile, they need only a short rotation. In many places, however, a 4- to 6-year rotation in which a legume hay crop is grown for a longer time can be used to better advantage.

Except for the Davidson soil, all the soils of this group can be satisfactorily worked over a relatively wide range of moisture content. The Davidson soil

to those on the red soils. The crops, rotations, and fertilization are about the same as for group A–1 soils. However, farmers tend to use shorter rotations on the soils of this group. Also, more of them use these soils for cultivated crops year after year than the soils having greater slope.

Good management practices for the soils of group A–3 are mainly those that will build up and maintain fertility. The soils are suitable for all crops grown in this area and for pasture. Where fertility is kept high, short rotations can be used satisfactorily. The soils, however, are low in organic matter, and rotations in which legume hay crops are grown for a longer time may be more desirable. These soils respond well to applications of potassium. The moisture range in which they can be cultivated satisfactorily is wide.

The Seneca soils generally occur in small areas, and they are used and managed in the same way as larger areas of adjacent soils. These soils are suited to all crops commonly grown, but home gardens, truck crops, and sorghum for sirup are grown to a large extent.

Except as stated above, the soils of group A–3 have essentially the same management requirements for crops and pasture as those in group A–1.

MANAGEMENT GROUP A–4

GRAYISH SANDY SOILS ON ROLLING OR MODERATELY SLOPING UPLANDS AND STREAM TERRACES

Management group A–4 consists of moderately well

MANAGEMENT GROUP A–5

BROWNISH TO GRAYISH FRIABLE FERTILE SOILS OF FIRST BOTTOMS

The soils in management group A–5 are deep and well drained but are subject to periodic overflow by streams. They are level to nearly level and fairly easily to easily worked and easily conserved. They respond well to good management. They are not subject to ordinary erosion, although some stream erosion may occur in places. These soils are readily permeable to plant roots, moisture, and air; they have a very high moisture-holding capacity and range from medium to strongly acid. The soils of this group are medium to very high in fertility. They are capable of retaining applied plant nutrients well and usually have a moderate supply of organic matter.

The soils of management group A–5 are listed below. The estimated acreages cultivated, pastured, forested, and idle are given in table 4.

Congaree fine sandy loam.
Congaree silt loam.
Mixed alluvium, well drained.

Use and management.—A large part of the Congaree soils in this management group is cultivated. A smaller part of Mixed alluvium, well drained, is cultivated, and a greater part is pastured, idle, and forested. Corn is the principal crop. Yields depend largely on fertilization and on rainfall during crop growth; they range from 15 to 50 bushels an acre. Most farmers plant corn year after year, but those getting better results grow corn in short rotations

phosphorus and potassium at seeding, is of great value in establishing pasture. Supplemental applications of phosphorus and potassium as well as lime should be made periodically for pasture.

MANAGEMENT GROUP A–6

SOMEWHAT POORLY DRAINED BROWNISH TO GRAYISH SOILS ON FIRST BOTTOMS AND LOW STREAM TERRACES

Although the soils of management group A–6 are deep, the water table is moderately high in all except the Augusta soil. Productivity for the group ranges from low to high. Workability ranges from poor to good, and conservability from good to very good. All the soils except the Augusta are not affected by ordinary erosion but may be subject to stream scouring in places. The erosion hazard is only slight to moderate on the Augusta soil. Permeability of the soils of this management group to roots, moisture, and air is moderate in the upper part and slow in the lower. The natural fertility ranges from low in the Augusta soil to very high in the Chewacla soils. The reaction in all the soils is medium to strongly acid.

The soils of management group A–6 are listed below. The estimated acreages cultivated, pastured, forested, and idle are given in table 4.

Augusta fine sandy loam.
Chewacla fine sandy loam.
Chewacla silt loam.
Mixed alluvium, somewhat poorly drained.

Use and management.—A large part of the acreage of soils in management group A–6 is cultivated or in

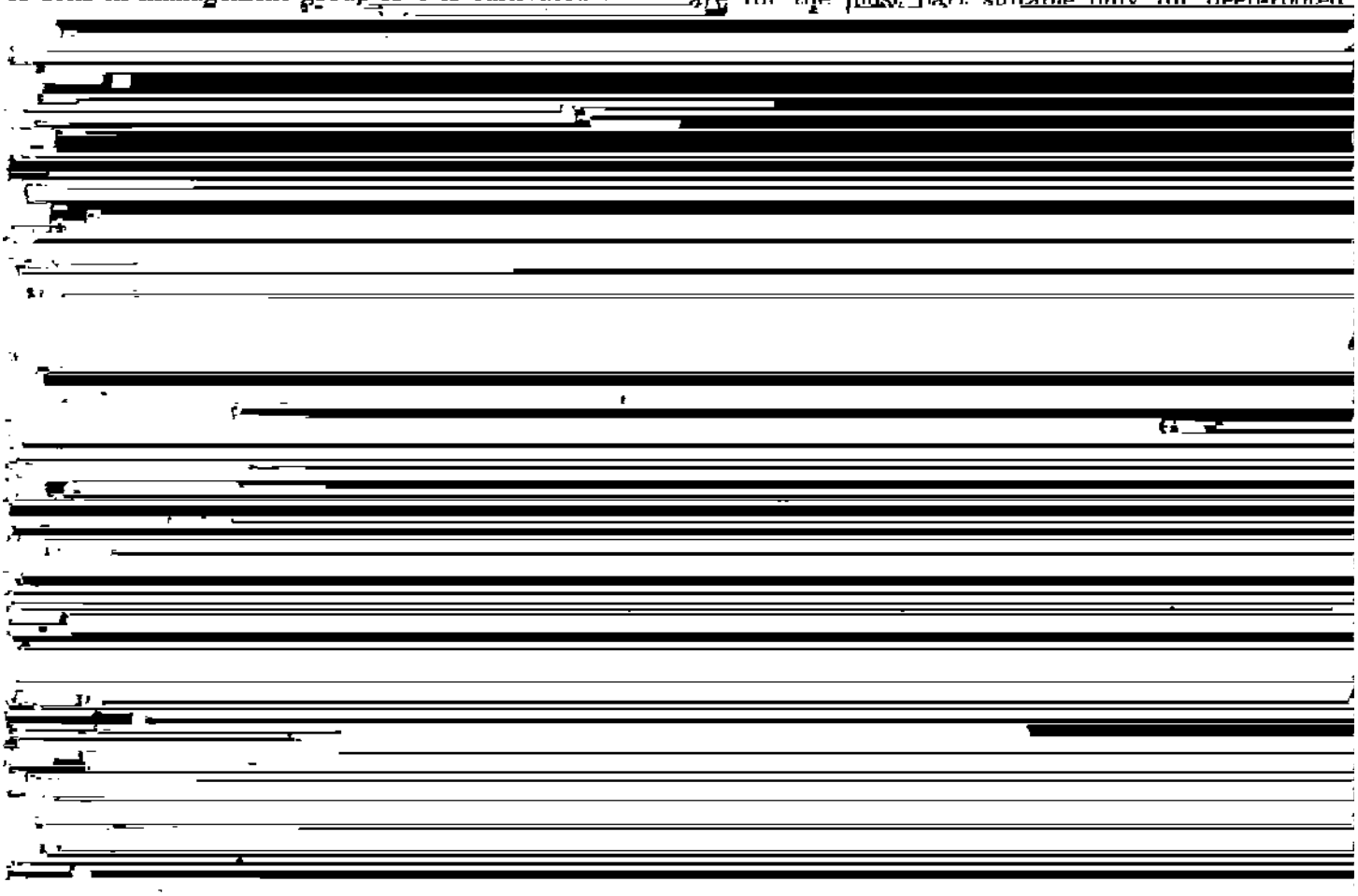
loam soils on fairly smooth interstream divides and moderate slopes leading to or toward drainageways. So much of the heavy subsoil of these soils has been exposed by erosion that infiltration of water is considerably slowed and the soils tend to dry out fairly readily. Workability of the group ranges from poor to fair, conservability from fair to poor, and productivity from low to very low. Fertility is low in all except the Lloyd soil, in which it is medium. Organic-matter content is low in all the soils, and the reaction is medium to strongly acid. These soils are moderately to highly susceptible to further erosion.

The soils of management group B–1 are listed below. The estimated acreages cultivated, pastured, forested, and idle are given in table 4.

Appling sandy clay loam, severely eroded rolling phase.
Cecil clay loam, severely eroded rolling phase.
Lloyd clay loam, severely eroded rolling phase.
Lockhart-Cecil clay loams, severely eroded rolling phases.
Madison clay loam, severely eroded rolling phase.

Use and management.—Only a small part of the soils of group B–1 is used for crops or pasture. The cropped areas are used chiefly for lespedeza or other hay crops, but yields are low. Little fertilizer is applied to these severely eroded and slightly droughty soils. The pasture is mostly unimproved. Broomsedge and a little bermudagrass and lespedeza are the usual pasture plants, and the carrying capacity and grazing value of the pasture are low.

Because of severe erosion, poor physical condition, droughtiness, and low fertility, the soils of this group are for the most part suitable only for deep-rooted



[redacted]

The soils of management group C–1 are listed below. The estimated acreages cultivated, pastured, forested, and idle are given in table 4.

Appling sandy clay loam, severely eroded hilly phase.
Appling sandy loam, steep phase.
Buncombe loamy fine sand.
Cecil clay loam, severely eroded hilly phase.
Cecil clay loam, severely eroded steep phase.
Cecil sandy loam, eroded steep phase.
Cecil sandy loam, steep phase.
Gullied land.
Hiwassee-Louisa soils, eroded hilly phases.
Iredell stony clay loam, rolling phase.
Lloyd clay loam, eroded steep phase.
Lloyd clay loam, severely eroded hilly phase.
Lloyd gravelly sandy loam, eroded steep shallow phase.
Lloyd sandy loam, steep phase.
Lockhart-Cecil clay loams, severely eroded hilly phases.
Lockhart-Cecil clay loams, severely eroded steep phases.
Lockhart-Cecil sandy loams, eroded steep phases.
Lockhart-Cecil sandy loams, steep phases.
Louisa fine sandy loam, eroded hilly phase.
Louisa fine sandy loam, eroded steep phase.
Louisa fine sandy loam, rolling phase.
Louisa fine sandy loam, steep phase.
Louisburg sandy loam, hilly phase.
Louisburg sandy loam, rolling phase.
Louisburg sandy loam, steep phase.
Made land.[1]
Madison clay loam, severely eroded hilly phase.

Land-capability classification

The capability grouping is an arrangement of soils made to show suitability for crops, grazing, forestry, wildlife, or other uses, and the risks of erosion or of other damage. It is widely used in helping farmers plan their practices for soil and water conservation.

Eight broad classes are provided in the capability arrangement. Each soil is placed in one of these broad classes after joint study by several persons of the ways it responds when it is used.

Soils that are easy to farm and are good for many uses are placed in capability class I. Such soils are not subject to more than slight erosion, drought, wetness, or other limitations and are at least fairly fertile. The farmer can use his class I soils for crops without special practices other than those needed for good farming anywhere. He can choose one of several cropping patterns, or if he wishes he may use the soil for pasture or trees or for other purposes.

Soils are placed in class II if they are a little less widely adaptable and thus more limited than those in class I. For example, a gently sloping soil may have a slight erosion hazard that requires contour farming or other practices to control runoff. Other soils may be placed in class II because they are too droughty, too wet, or too shallow to be in class I. Climate can also be a limiting factor if too cool or too dry, but is not a

of each subclass gives the general nature of most, but not necessarily all, of the soils included.

Class I.—Soils that are easy to farm and have no more than slight limitations in use. They can be used for intensive cultivation without special measures to control excess water or erosion, and they may be expected to produce high yields with good soil and crop management. No subclasses of class I are used.

Class II.—Soils that can be used for tilled crops with only slight risks of erosion or other limitations.

- IIe: Undulating soils subject to erosion.
- IIs: Light colored sandy soils that are slightly droughty.
- IIw: Bottom-land soils subject to occasional overflow.

Class III.—Soils that can be used for tilled crops but under moderate risk of erosion, excess water, or other limitations.

- IIIe: Rolling soils subject to erosion.
- IIIw: Soils with moderate limitations because of excess water.

Class IV.—Soils that have severe limitations for cultivation and under that use require extreme care.

- IVe: Eroded rolling soils and hilly soils.
- IVs: Droughty sandy soils of low fertility.
- IVw: Soils that are poorly drained and subject to overflow.

Class V.—Soils best suited to permanent vegetation

	Capability class and subclass
Cecil clay loam:	
Severely eroded rolling phase (Ca)	IVe.
Severely eroded hilly phase (Cb)	VIe.
Severely eroded steep phase (Cc)	VIIe.
Cecil sandy loam:	
Undulating phase (Cd)	IIe.
Eroded undulating phase (Ce)	IIe.
Rolling phase (Cf)	IIIe.
Eroded rolling phase (Cg)	IIIe.
Hilly phase (Ch)	IVe.
Eroded hilly phase (Ck)	IVe.
Steep phase (Cl)	VIe.
Eroded steep phase (Cm)	VIe.
Chewacla fine sandy loam (Cn)	IIIw.
Chewacla silt loam (Co)	IIIw.
Congaree fine sandy loam (Cp)	IIw.
Congaree silt loam (Cr)	IIw.
Davidson clay loam:	
Eroded undulating phase (Da)	IIe.
Eroded rolling phase (Db)	IIIe.
Eroded hilly phase (Dc)	IVe.
Grover fine sandy loam:	
Eroded undulating phase (Ga)	IIe.
Eroded hilly phase (Gb)	IVe.
Gullied land (Gc)	VIIe.
Helena sandy loam, eroded rolling phase (Ha)	IIIe.
Hiwassee sandy loam:	
Eroded undulating phase (Hb)	IIe.
Eroded rolling phase (Hc)	IIIe.
Hiwassee-Louisa soils, eroded hilly phases (Hd)	IVe.
Iredell stony clay loam, rolling phase (Ia)	VIe.
Lloyd clay loam:	
[illegible]	IIIe

	Capability class and subclass	
Madison-Grover-Louisa gravelly clay loams, severely		columns A. Under such management fertilizer and lime are applied more often and in larger amounts, crops are carefully selected and rotated, and legumes

lay loam:																
ded steep phase	Lc													6.3	4.7	
erely eroded hilly phase	Lb													6.0	4.5	
erely eroded rolling phase	La	5	10	(2)	(2)	(2)	(2)	.3	.5	.5	1.0	75	125	4.8	3.3	
gravelly sandy loam, eroded steep shallow	Ld															
andy loam:																
ded hilly phase	Lk	5	15	(2)	(2)	(2)	(2)	.4	.7	.5	1.0	100	150	5.2	3.6	
ded rolling phase	Lg	15	35	25	60	8	15	.6	1.3	.5	1.5	175	400	4.8	3.3	
ded undulating phase	Le	15	40	30	50	10	20	.8	1.3	.8	1.8	175	600	4.5	3.0	
ly phase	Lh	5	20	(2)	(2)	(2)	(2)	.4	.8	.5	1.0	125	175	5.0	3.5	
lling phase	Lf	20	40	30	65	10	20	.7	1.5	.5	1.5	200	500	4.5	2.5	
ep phase	Lm													6.0	4.0	
t-Cecil clay loams:																
erely eroded hilly phases	Lo													7.0	5.0	
erely eroded rolling phases	Ln							.3	.5	.3	.8			5.7	4.0	
erely eroded steep phases	Lp															
t-Cecil sandy loams:																
ded hilly phases	Lu	5	15	(2)	(2)	(2)	(2)	.4	.7	.3	.8	75	150	6.7	4.5	
ded rolling phases	Ls	10	30	20	50	8	12	.6	1.3	.3	1.0	150	400	6.1	4.0	
ded steep phases	Lw													7.0	4.8	
ded undulating phases	Lr	15	40	30	50	10	20	.8	1.3	.5	1.3	175	500	6.0	3.9	
ly phases	Lt	5	20	(2)	(2)	(2)	(2)	.4	.8	.5	.8	100	175	6.3	4.3	
ep phases	Lv													7.0	4.5	
ine sandy loam:																
ded hilly phase	Lxa													7.0	4.8	
ded steep phase	Lxc															
lling phase	Lx													5.8	3.9	
ep phase	Lxb															
rg sandy loam:																
ly phase	Lya													7.0	4.0	
lling phase	Ly									.3	.8			7.0	4.0	
ep phase	Lyb															
nd [5]	Ma															
a clay loam:																
erely eroded hilly phase	Mc													6.7	4.2	
erely eroded rolling phase	Mb	(2)	(2)	(2)	(2)	(2)	(2)	.3	.5	.3	1.0	(2)	(2)	5.3	3.6	
a fine sandy loam:																
ded hilly phase	Mh	5	15	(2)	(2)	(2)	(2)	.4	.7	.3	1.0	75	150	6.5	4.0	
ded rolling phase	Mf	15	30	20	50	8	12	.6	1.3	.5	1.3	150	400	5.5	3.5	
ded undulating phase	Md	15	40	30	50	10	20	.8	1.3	.8	1.8	175	600	5.1	3.1	
ly phase	Mg	5	20	(2)	(2)	(2)	(2)	.4	.8	.5	1.0	100	175	6.2	3.8	
lling phase	Me	15	35	25	60	12	20	.7	1.5	.8	1.5	175	500	5.3	2.9	
ep phase	Mk													6.8	4.2	
a gravelly sandy loam:																
ded rolling phase	Mm	15	30	20	50	8	12	.6	1.3	.5	1.0	150	400	6.0	3.7	
lling phase	Ml	15	35	25	60	8	15	.7	1.5	.5	1.0	175	500	5.8	3.5	
a-Grover-Louisa gravelly clay loams, severely d hilly phases	Mn													7.0	4.8	
a-Grover-Louisa gravelly sandy loams:																
ded hilly phases	Mp	5	15	(2)	(2)	(2)	(2)	.4	.7	.3	.8	75	150	6.8	4.5	
ly phases	Mo	5	20	(2)	(2)	(2)	(2)	.4	.8	.3	.5	100	175	6.5	4.2	
ep phases	Mr													7.6	5.5	
burg gravelly clay loam, eroded hilly phase	Ms													6.5	4.5	
burg gravelly sandy loam, eroded rolling	Mt	10	30	20	45	8	12	.6	1.3	.5	1.0	150	375	5.0	3.0	
lluvium:																
rly drained [4]	Mw													5.0	3.0	
newhat poorly drained [3 4]	Mv	10	25					(2)	(2)					4.5	2.7	
ll drained [3 4]	Mu	15	40					(2)	(2)					4.2	2.5	
loamy sand:																
ded undulating phase	My	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	.3	.8	(2)	(2)	6.0	4.0	
ht colored variant	Mx	10	30	20	45	8	12	.5	1.0	.5	1.0	150	375	5.5	3.3	
sh [2]	Ra															
fine sandy loam:																
el phase	Sa	15	40	30	50	10	20	.8	1.3	.8	1.5	175	500	4.5	2.2	
dulating phase	Sb	15	40	30	50	10	20	.8	1.3	.8	1.3	175	500	5.0	2.5	

TABLE 5. — *Average acre yields of principal crops to be expected over a period of years on the soils of Fulton County, Ga.—Continued*

Soil	Map symbol	Corn		Oats		Wheat		Lespedeza hay		Soybean hay		Cotton (lint)		Permanent pasture	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Acres per animal unit* [1]	*Acres per animal unit* [1]
Starr loam:															
Level phase	Sc	20	45	35	65	15	30	1.0	1.5	1.0	2.3	250	500	3.2	2.0
Undulating phase	Sd	20	45	35	65	15	30	1.0	1.5	1.0	2.3	250	500	3.5	2.1
Stony land:															
Hilly	Sf													7.0	5.0
Rolling	Se													6.5	4.5
Steep	Sg														
Unclassified city land [7]	Uc														
Wehadkee fine sandy loam [3]	Wa													4.7	2.8
Wehadkee silt loam [3]	Wb													4.5	2.5
Wickham fine sandy loam:															
Eroded undulating phase	Wd	20	45	30	60	10	20	.8	1.3	.8	2.0	200	600	4.0	2.0
Undulating phase	Wc	20	45	30	60	(2)	(2)	1.0	1.5	1.0	2.0	200	600	4.0	2.0
Worsham sandy loam:															
Eroded rolling phase	Wg													6.0	3.5
Eroded undulating phase	Wf													5.8	3.2
Undulating phase	We													5.5	3.0

[1] Average number of acres required to furnish without injury to the pasture adequate grazing for 1 animal unit for the grazing season, assumed to be 215 days. An animal unit is equivalent to 1 mature cow, steer, or horse, 5 hogs, or 7 sheep or goats.

[2] Crop not commonly grown but soil considered physically suited for it, though less suitable than for crops for which ratings are given.

[3] Subject to overflow every 4 or 5 years.

[4] Stream overflow was not considered in estimating average yield for this soil.

[5] Crop may bed down and be difficult to cure.

[6] Estimated yields are not given because the special uses for this miscellaneous land type are not agricultural.

[7] Estimated yields are not listed because the uses for Unclassified city land are primarily urban.

streams. The Cecil-Lloyd-Appling association follows areas of biotite gneiss, biotite schist, granite, and basic rock. The Madison-Louisa association is directly related to areas of mica schist and quartz mica schist. The Lloyd-Cecil-Madison association overlies basic rock, gneiss, granite, mica schist, and quartz mica schist. The Appling-Cecil association coincides with areas of granite, gneiss, and mica schist. The Cecil-Lockhart association follows areas of biotite gneiss, biotite schist, and porphyritic granite.

As shown on the soil association map, a part of Atlanta was not divided into soil associations. The part not divided amounts to about 14.2 percent of the county.

Congaree-Chewacla-Wickham

The Congaree-Chewacla-Wickham association covers about 11.5 percent of the county. It occurs in irregular and comparatively narrow strips on first bottoms and terraces along the Chattahoochee and Little Rivers and their tributaries. The relief is mostly level or nearly level, although some slopes are undulating.

Drainage is moderately good to good along the Chattahoochee River. Along the small streams, however, drainage is somewhat poor because sediment and undergrowth have clogged the stream channels and raised the water table. The natural fertility of the soils is moderate to high. The poorly drained Wehadkee soils occupy parts of the association and generally show mottling of different colors throughout their depth. Also in the association are well drained, somewhat poorly drained, and poorly drained areas of Mixed alluvium. Areas of Altavista, Augusta, Buncombe, Hiwassee, and Starr are minor components of this association.

Soils that are good to excellent for crops and pasture and those that are fair to good and good to very good for pasture make up the larger part of this association. The better drained areas can be farmed intensively, and their management requirements are reasonably simple. The poorly drained Wehadkee soils and poorly drained Mixed alluvium are very poor Seneca, and Worsham soils, as well as areas of rolling, hilly, and steep Stony land.

Soils of this association range from very poor to fair for crops and very poor to good for pasture. Some areas are so difficult to work or conserve that cultivation is not feasible under the prevailing systems of management. They are best suited to forest. A few soils are fair to good for crops and good to very good for pasture. They occur in undulating areas, mainly on ridgetops. Moderate to severe erosion is common on the soils of this association.

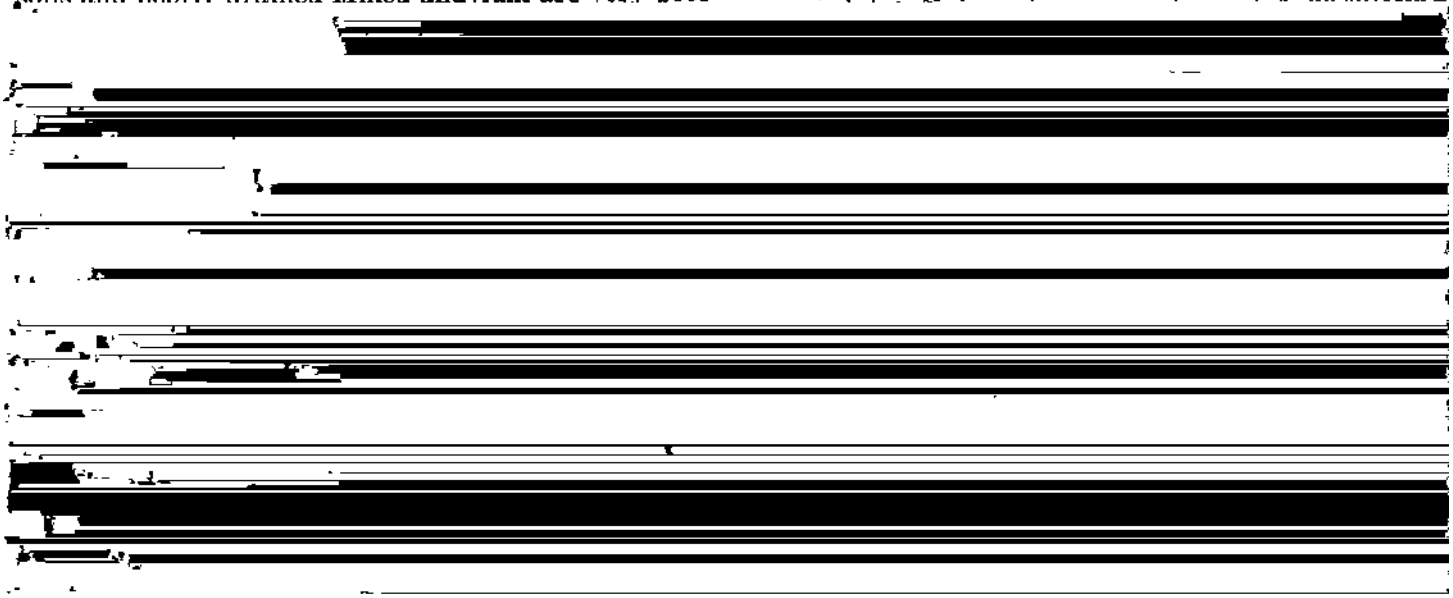
Much of this association has been cleared, but large areas, especially in the southern part of the county, are idle or in second-growth pine. The cultivated areas consist mainly of soils that are poor to fair for cultivated crops but fair to good for pasture. These soils generally occur on rolling areas that require careful management. Other soils in this association are very poor to poor for crops but fair to good for pasture. They occur mainly on hillsides and require good management to produce satisfactory pasture. Some soils of this association occur on steep slopes and are poor for crops and very poor to poor for pasture. They are best suited to forest.

General farms and dairy farms are typical on this association. Soil fertility should be improved, however, and erosion should be controlled if better yields are to be obtained.

Madison-Louisa

The Madison-Louisa soil association covers about 13.8 percent of the county. It occupies the most dissected uplands along the Chattahoochee and Little Rivers and some of their larger tributaries. Steep V-shaped valleys and sharp ridgetops characterize these uplands. The underlying rock is principally mica schist that has a high content of quartz in some areas.

The association has a thoroughly developed dendritic drainage system, and the soils are well drained to excessively drained. The natural fertility is generally low. A very small part of this association is



occurs on rolling to hilly uplands. In places, especially on ridgetops, the relief is undulating. The deep to moderately deep soils have formed over basic rock.

Cecil-Lockhart

The Cecil-Lockhart soil association includes about

3. Whether the areas will reseed naturally from surrounding woods in a reasonable time.
4. Market value of the product.
5. The resistance to disease and insects of the trees planted.
6. Other related problems.

Because each area has its own problems, it is advisable to get the help of the county agricultural agent, the local representative of the Soil Conservation Service, or State forester before planting. In Fulton County loblolly pine is especially effective in reclaiming eroded land. It will grow better on poor land and is in greater demand for lumber than hardwoods.

The following management practices are needed for forested areas:

1. Maintenance of a full stand of desirable species.
2. Prevention of damage by fire, grazing livestock, and harvesting equipment.
3. Harvesting mature trees and replacing them by desirable species.

Morphology and Genesis of Soils

Soil is the product of forces of weathering and soil development acting on the parent material deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent materials; (2) the climate under which that material accumulated and has since existed; (3) the plant and animal life in and on the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of development have acted on the soil material (*13*).

Climate and vegetation change the parent material from an inert heterogeneous mass into a body that has a definite genetic morphology. The effects of these two factors on the parent material are accelerated, or retarded, to varying degrees by relief. Relief, in turn, affects runoff, the movement of water through the soil, the rate of natural erosion, the vegetation, and exposure to sun and wind.

The kind of parent material also affects the results of the forces of climate and vegetation. Parent material is important in determining internal soil conditions and the kinds of natural vegetation that grow on the soil.

Finally, time is a factor in the development of the soil into a body that is in equilibrium with its environment. The degree of such development depends not only upon time, but also on the rate at which the forces of climate and vegetation act, which, in turn, is affected by the relief and parent material.

Factors of Soil Formation

Parent material

The parent materials of the soils of Fulton County fall within two broad classes based on source: (1) Residual materials from rocks decomposed in place; and (2) transported materials, or material removed from its original position by gravity or water and deposited on upland slopes or near streams. Materials of the first class are related directly to the underlying rocks from which they were derived; those of the second class are related to the soils or rocks from which they were washed.

Igneous and metamorphic rocks have given rise to the residual material. The rocks differ considerably in chemical and mineralogical composition, and parent materials derived from them likewise differ. The geologic period in which the rocks formed is unknown, but it is generally regarded as the pre-Cambrian. The rocks are mainly biotite gneiss, biotite schist, porphyritic granite, porphyritic granite gneiss, granite gneiss, hornblende gneiss, quartzite, and Brevard schist. Biotite gneiss and biotite schist are the dominant rocks.

Many of the soil series closely coincide in distribution with areas of certain rocks. Soils of the Appling series are most commonly developed in areas where the underlying rocks are granite or granite gneiss of relatively high quartz and feldspar content. The Cecil soils commonly occur where biotite gneiss and biotite schist dominate. However, where these rocks are relatively high in mica, they give rise to the darker more friable Madison soils. Lockhart soils generally overlie porphyritic granite. Davidson, Mecklenburg, and Iredell soils have developed in areas of basic rock, such as hornblende gneiss, hornblende schist, or diorite. The Lloyd soils coincide with rock formations made up of a mixture of basic and acidic rocks. Where the underlying rock is quartz-mica schist or gneiss high in quartz, soils of the Grover series have developed.

The material giving rise to soils of first bottoms and stream terraces is alluvial and has been transported from areas underlain by several different kinds of rock. No direct relationship can be established between this material and the rocks of its origin. Soils that have formed from local colluvium and alluvium have characteristics, as color and texture, similar to those of the adjacent soils from which their material washed.

Porphyritic granite occurs northwest of Palmetto and in the vicinity of Ben Hill (*6*). It is coarse-textured and is composed largely of quartz and feldspar. Many large quartz and feldspar components are conspicuous in the rock. Exposures of granite gneiss are common throughout the county, but the larger areas are north of Alpharetta and adjacent to a belt of Brevard schist along the Chattahoochee River. Hornblende gneiss and hornblende schist occur in several locations in the county, largely south of Alpharetta, west of Roswell, and east of Hapeville. Quartzite occurs in narrow bands north of Peachtree Creek and east of Alpharetta.

The belt of Brevard schist follows the general course of the Chattahoochee River. It is part of a belt crossing the State and extending between Oconee County, S. C., and Randolph County, Ala. This schist exhibits considerable variety from place to place. In Fulton County it ranges from a shalelike rock to a schist composed of light-colored mica (probably altered muscovite), quartz, and feldspar. It occurs in a narrow belt, mostly in the steep part of the county along the Chattahoochee River, although some areas

are partly covered by the flood plain of the river. Peridotite, serpentine, and other ultrabasic rocks occur along the boundary of Fulton and De Kalb Counties, south of Atlanta.

Climate

Fulton County has relatively long warm summers, short mild winters, and moderately heavy rainfall. As moderately warm weather prevails during much of the year, and the soil is moist most of the time, chemical reactions are rapid. Soaking rains have caused the leaching from the soil of soluble materials, as bases; and also the transfer downward in the soil of less soluble materials and colloidal matter. The soil is frozen for only brief periods and to very shallow depths; the weathering and the translocation of insoluble materials is therefore intensified. Because of soil leaching, free carbonate of lime has not accumulated in the soil, although calcium is present in mineral components of many of the rocks.

The soils of Fulton County range from slightly acid to strongly acid. Analyses were made to determine the acidity of some of the major soils of the county. The tests were made by glass-electrode pH meter in the laboratory of the University of Georgia from samples taken at various depths. The pH determinations are as follows:

Soil type and sample number:

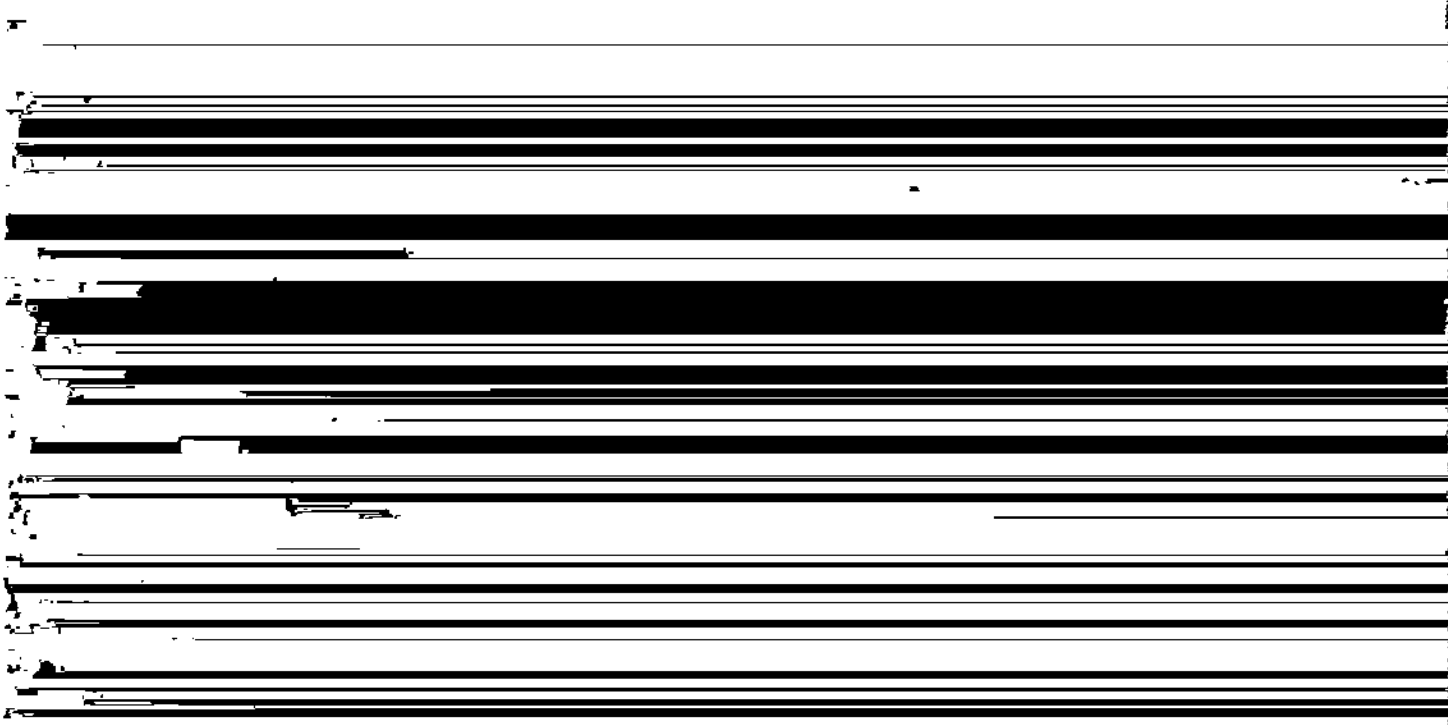
	Inches	*pH*
Cecil sandy loam:		
1	0– 7	5.34
2	7–10	5.28
3	10–25	5.52
4	25–36	5.70
5	36+	5.56
Madison fine sandy loam:		
1	0– 8	5.82
2	8–24	5.52
3	24–36	5.42

The kinds of indigenous plants and animals are determined by climate and many other environmental factors. The influence of climate is the most apparent, though not always the most important, in determining the kinds of higher plants that grow on the well-developed, well-drained soils. In this indirect way climate greatly influences the morphology of soils. Climate and vegetation acting together, therefore, are the active factors of soil genesis.

Fulton County is in the oak-pine subdivision of the southern hardwood forest of the eastern forest region of the United States (*10*). Although oak and pine distinguish this forest belt from other forested areas, many other kinds of trees are present. The soils of the county formed under this predominantly oak-and-pine cover, but during the process only a small quantity of forest organic matter was incorporated with the soils. In the present forested areas, mainly steep land and stony land, a thin layer of forest litter and leaf mold covers the soil. A small quantity of organic matter, composed of decayed leaves, bark, and twigs, is mixed with the upper inch or so of the surface layer.

The trees native to Fulton County are moderately deep to deep feeders on plant nutrients in the soil. In this oak-pine region, only a part of the species shed their leaves annually. Although the leaves differ considerably among species in their supply of various plant nutrients, in general the quantities of bases and phosphorus returned to the soil by the leaves of deciduous trees are greater than those returned by the needles of coniferous trees. Essential plant nutrients are thus restored by leaves to the upper part of the soil from the lower part.

Organic matter from various plants is acted on by micro-organisms, earthworms, and other forms of life, and by direct chemical reactions. In this county such materials decompose rather rapidly because of favorable temperature and moisture conditions, favorable character of the organic material itself, and presum-



through the soil is small, and the extent of leaching and translocation of material is correspondingly small.

Age

Some soils have not been in place long enough to show the influence of climate and vegetation. Consequently they have not developed well-defined and genetically related profile horizons. Most soils of the first bottoms and colluvial slopes are composed of such materials. Soils of steep slopes have their materials constantly replenished or removed by geologic erosion and do not develop genetically related horizons. These two broad groups comprise the young soils of the county.

Soils that have been in place for a long time and have approached equilibrium with their environment are considered mature or old. In some nearly level or undulating areas where internal drainage is slow and soil parent material has been in place for a long time, the soils have characteristics that well-drained soils do not have. Their subsoil may be mottled, and it may contain a very firm or very compact claypan. Geologic erosion usually is slow, and highly leached surface soil may be formed. Such soils are very old

clayey. In many areas of steep land, loose rock fragments are scattered over the surface and outcrops of bedrock are common.

In the taxonomic classification of soils, the normal profile serves as a basis for comparisons. In Fulton County this profile has a relatively light-colored surface soil, or A horizon, of coarse to fine texture; a uniformly colored, fine-textured, firm to friable subsoil, or B horizon; and a light-colored parent material layer, or C horizon, which is usually coarser textured than the B horizon and finer textured than the A horizon. In the A horizon the textures are mainly sandy loam and fine sandy loam and, to a less extent, silt loam and clay loam. The textures of the B horizons are prevailingly sandy clay loam and clay loam. In the C horizon the materials vary according to the character of the parent rock and degree of weathering. The texture may be sandy loam, sandy clay loam, or clay loam. The thickness of the horizons differs somewhat in different soils. That of the A horizon ranges from about 4 to 12 inches, and that of the B horizon, from about 12 to 36. The C horizon, which for the most part consists of decayed rock material, ranges in thickness from a few inches to many feet.

Normal, or mature, soil profiles have developed in most parts of the county on gentle to smooth inter-

gories and the relief, parent material, and of each

ent material	Degree of horizon differentiation
thering of—	
e; mica schist in places	Very high.
nite	Very high.
ist	Very high.
s; mica schist in places	High.
ist, or gneiss having large con-	High.
kely recent origin	High.
kely recent origin	Medium.
thering of—	
fly hornblende	High.
d with granite, gneiss, or mica	High.
fly diorite	High.
r a long time	High.
thering of—	
diorite in places	Very high.
fly diorite	Very high.
vium of local origin derived	Medium to high.
ing and Cecil soils.	
kely recent origin	Medium to high.
thering of—	
r gneiss	Very low.
quartz mica schist	Low.
r a long time	Very low.
vium of local origin derived	
and Madison soils	Low.
, Cecil, and Madison soils	Low.
rigin; new material deposited	Very low.
rigin, new material deposited	Low to very low.
rigin; new material deposited	Low.
rigin; new material deposited	Very low.

areas, however, uniform conditions of climate, vegetation, and parent material prevail, and the relief and drainage may be so uniform that only a few soils (or even only one soil) representing the great soil groups have developed. In such areas the catenas may be incomplete because all members either are not present or occur in unmappable patterns. In this county most catenas are incomplete.

Morphology of Soils by Great Soil Groups

Red-Yellow Podzolic soils

Red-Yellow Podzolic soils are a group of well-developed, well-drained acid soils having thin organic (A_0) and organic-mineral (A_1) horizons, over a light-colored bleached (A_2) horizon, over a red, yellowish-red, or yellow more clayey (B) horizon. Parent materials are all more or less siliceous. Coarse reticulate streaks or mottles of red, yellow, brown, and light gray are characteristic of deep horizons of Red-Yellow Podzolic soils where parent materials are thick (*12*).

Red-Yellow Podzolic soils have developed under deciduous, coniferous, or mixed forest in warm-mesothermal to tropical, humid to perhumid climates. In cultivated areas the A_0 and A_1 horizons are incorporated in the plow layer, and in many places accelerated erosion has removed all or nearly all of the A horizon, and the B is exposed. The clay fraction is dominated by kaolinite but contains considerable free ferric oxides or hydroxides and, in places, a relatively small proportion of aluminum hydroxide. Hydrous mica and montmorillonite dilute the clay fraction in some of the soils but are not considered typical. In any specific parent material, the reticulate streaks generally occur higher in the profiles with yellow B horizons than in those with red B horizons. In a few members of the group, especially the very sandy ones, the streaked material may be absent. Other well-developed, well-drained red and yellow soils, without podzolic morphology, are associated with Red-Yellow Podzolic soils. Red-Yellow Podzolic soils were classified separately as Red Podzolic and Yellow Podzolic soils in Soils and Men (*13*).

In this county the Cecil, Lockhart, Madison, Wickham, Appling, Grover, and Altavista series have the common characteristics of Red-Yellow Podzolic soils. Although the soils may range somewhat in maturity within the series, all are old enough to have at least a moderately well developed Red-Yellow Podzolic profile. In this classification the Cecil, Lockhart, Madison, and Wickham series may be considered as representing the red members of the Red-Yellow Podzolic soils, and the Altavista series the yellow division. The Appling and Grover series may be considered as representing an intermediate color position between that of the red and yellow.

In Fulton County, Cecil sandy loam has developed a normal profile typical of the red soils of the Red-Yellow Podzolic group. A profile description follows of Cecil sandy loam, undulating phase, under an original forest cover of oak, hickory, and scattered pine in a well-drained area along Welcome All Road near Welcome All Church:

A_{00} 0 to 1 inch, forest litter consisting of leaves, twigs, and bark; some leaf mold.
A_1 1 to 1½ inches, dark-gray (10YR 4/1)[6] loose sandy loam; moderate content of well incorporated organic matter.
A_2 1½ to 8 inches, yellowish-brown (10YR 5/4) friable sandy loam; weak fine crumb structure; roots apparently penetrate with moderate ease.
A_3 8 to 11 inches, yellowish-red (5YR 5/8) friable heavy sandy loam; weak medium crumb structure.
B_1 11 to 27 inches, red (10R 4/8) firm clay; moderate medium-blocky structure; a few mica flakes.
B_2 27 to 38 inches, red (2.5YR 4/8) firm clay; moderate medium blocky structure; mica flakes more numerous than in horizon B_1.
B_3 38 to 50 inches, red (2.5YR 5/8) friable clay; brownish-yellow (10 YR 6/8) distinct coarse mottles in moderate numbers; weak medium crumb structure; considerable quantity of mica flakes and some decayed gneiss or quartz mica schist.
C 50 inches +, decomposed gneiss or quartz mica schist.

The Lockhart profile is similar to that of the Cecil but differs in the character of its parent material and in having many very coarse feldspar and quartz particles. The Madison profile also is similar to the Cecil in nearly all characteristics. It differs, however, in having a greater mica content and generally a more friable B horizon. The Wickham profile, formed from moderately young alluvium on low stream terraces, has a browner color in the A horizon than the Cecil and a reddish brown instead of red B horizon. The main differences between the Appling and Grover profiles and that of the Cecil profile is in the color of the B horizon—in the Appling, yellowish red and in the Grover, reddish yellow. The Grover profile is more micaceous than the Appling and has formed over rock usually having a much higher mica content. The Altavista profile has developed over moderately young alluvium on low stream terraces. It has a light olive-brown friable A horizon and an olive-brown firm B horizon. The B horizon is friable and coarsely mottled with light olive brown and red in the lower part.

Reddish-Brown Lateritic Soils (Latosols)

Reddish-Brown Lateritic soils are a zonal group of soils with dark reddish-brown granular surface soils, red friable clay B horizons, and red or reticulately mottled lateritic parent material; they developed under a humid tropical climate with wet-dry seasons and a tropical forest vegetation (*13*). Laterization, with little or no podzolization, has dominated in the development of these soils. Laterization is the process of silica removal, with consequent increase in the alumina and iron content and decrease in base-exchange capacity of the soil.

In Fulton County the Davidson, Lloyd, Mecklenburg, and Hiwassee series have the characteristics described for Reddish-Brown Lateritic soils (Latosols). These soils have developed from rock materials that, in general, are relatively high in bases and have been in place for a long time. The well-developed profile has a uniformly colored B horizon ranging from red to reddish brown, although some mottling usually appears in the B horizon of the Mecklenburg soil. The Davidson and Mecklenburg soils have formed over

[6] Figures in parentheses are Munsell color notations.

dark-colored basic rocks, the Lloyd soils over a mixture of basic and acidic rocks, and the Hiwassee soils over old high-terrace alluvium.

Davidson clay loam, eroded undulating phase, may be considered typical of the Reddish-Brown Lateritic soils in this county. A profile in a less eroded area has characteristics as follows:

- A_p 0 to 7 inches, dark reddish-brown (5YR 3/3) friable to firm clay loam of moderate medium crumb to fine blocky structure.
- B_2 7 to 45 inches, dark-red (2.5YR 3/6) firm clay having moderate medium to fine blocky structure; sticky when wet, hard when dry.
- B_{23} 45 to 57 inches, dark-red (2.5YR 3/6) friable clay loam having moderate fine blocky to weak coarse blocky structure.
- C 57 inches +, partly decayed dark basic rock mixed with yellow friable clay loam material.

The Davidson series has a counterpart in the Decatur series of the Valley and Ridge province of the Appalachian Highlands.

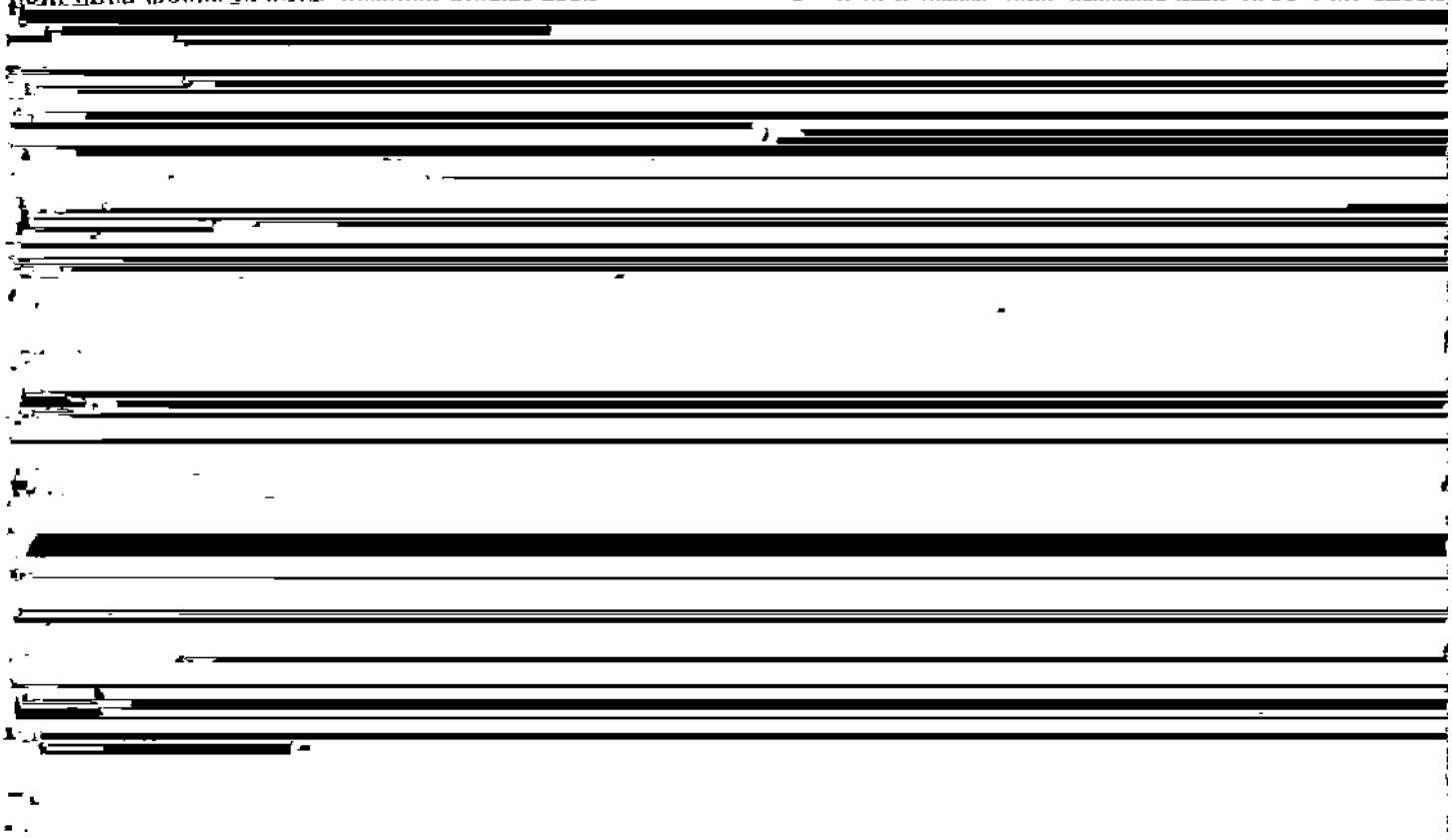
The Lloyd soils have formed in residuum derived from a mixture of acidic and basic rocks. In appearance and development they are about intermediate between the Davidson and Cecil soils. The A horizon is reddish brown and friable, and the B horizon is red and firm. The C horizon is detritus from basic rock mixed with that from granite, gneiss, or mica schist.

The Mecklenburg soils vary somewhat in color, consistence, and structure. Morphologically they are about intermediate between the Davidson soils and the Iredell soil (classified as Planosols). In some places profile development approaches that of the Davidson and in others that of the Iredell. The A horizon is grayish brown to reddish brown and friable. The subsoil is firm and is reddish brown, slightly mottled with brown and yellow. The C horizon, in most places, is light olive yellow to olive decayed diorite rock.

the Augusta soil is on low stream terraces. In each of these soils there is a firm or very firm layer caused by the concentration of clay within the profile. This layer hinders or almost prevents percolation of water through the profile. The Helena soils have formed from residuum of aplitic granite mixed in places with residuum of diorite, and the Iredell soil has formed from residuum derived principally from diorite. The Worsham soils have developed mostly from local colluvium and alluvium (largely acidic), and the Augusta soil has developed over moderately young alluvium.

The cause for formation of claypans in the profiles of the Planosols in this county cannot be fully explained. In the Helena soils a partial cause may be the downward migration and subsequent concentration of the finer soil separates in the profile, but the main cause is probably the thorough decomposition of clay-forming minerals directly from the decaying parent rock. In the Iredell soil the clay layer doubtless is made up of thoroughly decomposed clay-forming minerals that came directly from decomposed parent rock. The heavy layer in the Worsham soils probably is the result of the translocation of fine soil separates by percolating waters. Obstruction of some sort at the bottom of the profile may have prevented further downward movement of these fine particles and caused their concentration. The claypan in the Augusta soil profile may be a dense layer, left from the original alluvium, that has not been changed much in composition by soil-forming processes. On the other hand, it may have been formed in the same way as the heavy layer of the Worsham soils.

Helena sandy loam, eroded rolling phase, is representative of the Planosol group. A description of a profile in a less eroded area follows:



with yellow, and it is heavy almost throughout. In the bottom part, it is white, moderately mottled with pale yellow and weak brown. In some areas residual material, in its original place, has contributed somewhat to soil formation.

The Augusta soil was formed on low stream terraces from moderately young alluvium. It is associated with the Red-Yellow Podzolic Altavista soils but differs from them in being somewhat poorly drained and in having a heavy claypan B horizon. The A horizon is light brownish gray and very friable. The upper part of the B horizon is light yellowish-brown firm fine sandy clay. The bottom part is light-gray, mottled with white and brownish-yellow, firm fine sandy clay.

Lithosols

Lithosols are an azonal group of soils having no clearly expressed soil morphology and consisting of a freshly and imperfectly weathered mass of rock fragments; they are largely confined to steeply sloping land (*13*).

In this county members of the Louisburg and Louisa series are classified as Lithosols. The soils of these two series occupy positions on uplands having very strong slopes and very narrow ridgetops. The slopes are rolling to steep; the smoother parts are on the ridge crests. The profiles are shallow, and little or no true B horizon has developed. Disintegrated bedrock lies at depths of about 18 to 28 inches. The two series differ chiefly on the basis of parent rock and mica consists of Cecil or Lockhart soil material. It varies from shallow to moderately deep and because of unfavorable environment has very little if any genetic profile development. Gullied land consists mainly of areas of Cecil and Lockhart soils that were once cultivated. These areas have been reduced to an intricate system of gullies through erosion. In many places much of their profile has been washed away.

Regosols

Regosols are an azonal group of soils consisting of deep unconsolidated rock (soft mineral deposits) in which few or no clearly expressed soil characteristics have developed; they are largely confined to recent sand dunes, and to loess and glacial drift on steeply sloping lands (*12*).

The Molena series is the only member of the Regosols group in this county. The soil is on old high stream terraces where it has formed over old alluvium, mostly sand. The profile differs somewhat in color and texture but shows very little differentiation in consistence. This series has a counterpart in the Americus series of the Coastal Plain, but generally its soils contain somewhat more clay.

Molena loamy sand, eroded rolling phase, occurs in this county. Following is a profile description in a cleared area:

1. 0 to 12 inches, brown (7.5YR 4/4) very friable loamy sand; structureless.
2. 12 to 24 inches, yellowish red (5YR 4/6) very friable loamy sand; structureless.

mainly from Lloyd, Davidson, Cecil, and Madison soils, and their profiles usually are yellowish red. The material of the Seneca soils has come mostly from Appling, Cecil, and Madison soils, and their profiles usually are dark grayish brown in the upper part and grayish brown in the lower part.

The Congaree, Buncombe, Chewacla, and Wehadkee series comprise a catena in which the Buncombe is excessively drained; the Congaree, well drained; the Chewacla, somewhat poorly drained; and the Wehadkee, poorly drained. Differentiation among series of this group is made largely on the basis of differences in drainage.

The soils of this catena have counterparts in the

and to learn the things about this soil that influence its capacity to grow plants.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the amount of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers, and it is later checked by laboratory analysis. Texture determines how well soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil par-

phases, or mapping units, because of differences in slope and erosion.

The following shows how the Appling series is grouped into types, and the types, in turn, into phases:

Series	Type	Phases
Appling	Appling sandy loam	Undulating phase. Eroded undulating phase. Rolling phase. Eroded rolling phase. Hilly phase. Eroded hilly phase. Steep phase.
	Appling sandy clay loam	Severely eroded rolling phase. Severely eroded hilly phase

Soil type.—Soils similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, type of drainage (natural or artificial), and presence of excess soluble salts are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices therefore can be specified for the soil phase more easily than for soil series or yet broader groups that contain more variation.

Soil series.—Two or more soil types that differ in surface texture, but that are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which the soil was first mapped. Thus, Appling is the name of a soil series that occurs over granite or gneiss, or mica schist in places, in Fulton County. It was first recognized near the town of Appling in Columbia County, Ga., in 1911.

Miscellaneous land types.—Fresh stream deposits, or rough, stony, and severely gullied areas that have little true soil are not classified by types and series; they are identified by descriptive names such as stony land, riverwash, and so on. Riverwash, and Stony land, steep, are examples of miscellaneous land types in Fulton County.

Soil complex.—When two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. Lockhart–Cecil sandy loams, hilly phases, is a complex of Lockhart sandy loam, hilly phase, and Cecil sandy loam, hilly phase.

Definitions of many soil terms used in the report are given in the glossary.

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Glossary

Alluvium. Sand, mud, and other sediments deposited on land by streams.

Bedrock. The solid rock underlying soils and other earthy surface formations.

Clay. Mineral soil particles less than 0.002 mm. (0.000079 in.) in diameter. (Formerly included grains less than 0.005 mm. in diameter.)

Claypan. Compact horizons or layers rich in clay and separated more or less abruptly from the overlying horizon.

Colluvium. Deposits of rock fragments and soil material near the base of slopes. The deposits have accumulated through the influence of gravity and includes creeps, slides, and local wash. In many areas colluvium is of mixed character.

Complex, soil. An intricate mixture of areas of different kinds

ration. Terms commonly used to describe consistence include compact, firm, friable, loose, plastic, and sticky.

Compact. Dense and firm but without any cementation.

Firm. Soil material crushes under moderate pressure between thumb and forefinger but resistance is distinctly noticeable.

[redacted]

breakage, as in some of the fine-textured alluvial soils; structureless.

Morphology, soil. The physical constitution of the soil including the texture, structure, consistence, color, and other physical and chemical properties of the various soil horizons that make up the soil profile.

[redacted]

Single grain soil. (*See also* **Structure, grade**). A structureless soil in which each particle exists separately, as in dune sand.

Slope classes. As used in this report, they are as follows:

	Percent		*Percent*
Level	0–2	Hilly	10–15
Undulating	2–6	Steep	15–25
Rolling	6–10		

Soil. A natural body on the surface of the earth characterized by conformable layers resulting from modification of parent material by physical, chemical, and biological forces over periods of time.

Soil classes. Based on the relative proportion of soil separates. The principal classes, in increasing order of the content of the finer separates, are as follows: Sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay.

Soil separates. The individual size groups of mineral soil particles, as sand, silt, and clay.

Stripcropping. The practice of growing ordinary farm crops in long strips or bands of variable widths across the line of slope, or approximately on the contour. Close-growing crops are seeded in alternate strips with clean-tilled crops.

Structure, soil. The morphological aggregates in which the individual soil particles are arranged. It may refer to their natural arrangement in the soil when in place and undisturbed or to the soil at any degree of disturbance. Soil structure is classified according to grade, class, and type.

Grade. Degree of distinctness of aggregation. Grade expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: Structureless (single grain or massive), weak, moderate, and strong.

Class. Size of soil aggregates. Terms: Very fine or very thin, fine or thin, medium, coarse or thick, and very coarse or very thick.

Type. Shapes for soil aggregates. Terms: Platy, prismatic, columnar, blocky, subangular blocky, granular, and crumb. (Example of soil-structure grade, class, and type: Moderate coarse blocky.)

Subsoil. Technically, the B horizon of soils with distinct profiles: roughly, that part of the profile below plow depth.

Substratum (*See also* **Horizon, C; and Parent Material**). Any layer lying beneath the solum or true soil.

Surface soil. Technically, the A horizon; commonly, the part of the upper profile usually stirred by plowing.

Terrace (for control of runoff, soil erosion, or both). An embankment or ridge constructed across sloping soils on or approximately on contour lines, at specific intervals. The terrace intercepts surplus runoff in order to retard it for infiltration into the soil or to direct any excess flow to an outlet at nonerosive velocity.

Terrace (geological). An old alluvial plain, usually flat or undulating, bordering a stream; frequently called second bottoms as contrasted with flood plains; seldom subject to overflow.

Texture. Size of individual particles making up the soil mass. It specifically refers to the proportions of sand, silt, and clay. A coarse-textured soil is one high in content of sand; a fine-textured soil has a large proportion of clay.

Type, soil. A subdivision of the soil series based on the texture of the surface soil.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying in general at higher elevation than the alluvial plain or stream terrace.

Principal characteristics of the

Soil	Map symbol	Slope range	Parent material	Topographic position	Natural drainage	Soil profile	
						Surface soil	Subsoil
		Percent					
Altavista fine sandy loam:							
Eroded rolling phase	Ac	6–10	Moderately young alluvial material.	Low stream terraces	Moderately good to somewhat excessive.	Light olive-brown to olive-brown very friable or friable fine sandy loam, or friable heavy fine sandy loam.	Olive-yellow, firm, heavy fine sandy clay loam passing into light olive-brown (mottled with red) friable fine sandy clay loam.
Level phase	Aa	0– 2	Same	Low stream terraces	Moderately good	Light olive-brown very friable fine sandy loam.	Same
Undulating phase	Ab	2– 6	Same	Low stream terraces	Moderately good	Same	Same
Appling sandy clay loam:							
Severely eroded hilly phase	Ae	10–15	Residual material from weathered granite or gneiss, or mica schist in places.	Short strong slopes near or along drainageways.	Somewhat excessive	Grayish-brown to yellowish-red friable sandy clay loam.	Yellowish-red firm sandy clay in upper part; yellowish-red (mottled with gray and brown) friable sandy clay in lower part.
Severely eroded rolling phase	Ad	6–10	Same	Fairly smooth interstream divides and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Same	Yellowish-red firm sandy clay in upper part; yellowish-red (mottled with gray and red) friable sandy clay in lower part.
Appling sandy loam:							
Eroded hilly phase	Am	10–15	Same	Short strong slopes near or adjoining drainageways.	Somewhat excessive	Grayish-brown friable sandy loam, or grayish-brown to yellowish-red friable sandy loam to heavy sandy loam.	Same
Eroded rolling phase	Ak	6–10	Same	Broad fairly smooth interstream divides and gradual slopes to or toward drainageways.	Good to somewhat excessive.	Same	Same
Eroded undulating phase	Ag	2– 6	Same	Smooth interstream divides and gentle slopes to or toward drainageways.	Good	Same	Same
Hilly phase	Al	10–15	Same	Short strong slopes near or adjoining drainageways.	Somewhat excessive	Grayish-brown friable sandy loam.	Same
Rolling phase	Ah	6–10	Same	Fairly smooth interstream divides and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Same	Same
Steep phase	An	15–25	Same	Short very strong slopes ad-	Somewhat excessive	Same	Same

soils of Fulton County, Georgia

Soil depth [1]	Erosion hazard	Permeability		Moisture-holding capacity	Natural fertility	Workability	Range of suitability	Principal use	Management group
		Surface soil	Subsoil						
Deep	Moderate to high	Moderate	Moderate to slow	Moderate	Low	Good	Medium	Cultivated land and pasture	A–4.
Deep	None to slight	Moderately rapid	Moderate to slow	Moderate	Low	Very good	Wide	Same	A–3.
Deep	Slight to moderate	Moderately rapid	Moderate to slow	Moderate	Low	Very good	Wide	Same	A–3.
Deep	High	Moderate	Moderate	Moderate	Low	Very poor	Very narrow	Forest, idle land, and pasture	C–1.
Deep	Moderate to high	Moderate	Moderate	Moderate	Low	Fair	Narrow	Same	B–1.
Deep	High	Moderate to moderately rapid.	Moderate	Moderate	Low	Poor	Narrow	Forest, cultivated land, idle land, and pasture.	B–3.
Deep	Moderate to high	Same	Moderate	Moderate	Low	Fair to good	Medium	Cultivated land, pasture, and idle land.	A–4.
Deep	Slight to moderate	Same	Moderate	Moderate	Low	Very good	Wide	Same	A–3.
Deep	High	Moderately rapid	Moderate	Moderate	Low	Poor	Narrow	Forest	B–3.
Deep	Moderate to high	Moderately rapid	Moderate	Moderate	Low	Good	Medium	Cultivated land, pasture, and idle land.	A–4.
Deep	High to very high	Moderately rapid	Moderate	Moderate	Low	Poor to very poor.	Very narrow	Forest	C–1.
Deep	Slight to moderate	Moderately rapid	Moderate	Moderate	Low	Very good	Wide	Cultivated land, pasture, and idle land.	A–3.
Deep	Slight to moderate	Moderate	Slow	Moderate	Low	Fair	Medium	Cultivated land and idle land	A–6.
Deep	None; alluvium deposited periodically.	Very rapid	Very rapid [2]	Low	Low	Very good	Narrow	Forest, idle land, cultivated land, and pasture.	C–1.
Deep	High	Moderate	Moderate	Moderate	Low	Very poor	Very narrow	Forest and idle land	C–1.
Deep	Moderate to high	Moderate	Moderate	Moderate	Low	Poor	Narrow	Same	B–1.
Deep	High to very high	Moderate	Moderate	Moderate	Low	Very poor	Very narrow	Forest	C–1.
Deep	High	Moderately rapid to	Moderate	Moderate	Low	Poor	Narrow	Forest, cultivated land, and	B–3.

Principal characteristics of the soils of

Soil	Map symbol	Slope range	Parent material	Topographic position	Natural drainage	Soil profile	
						Surface soil	Subsoil
		Percent					
Cecil sandy loam—Continued:							
Eroded undulating phase	Ce	2–6	Same	Smooth interstream divides and mild slopes to or toward drainageways.	Good	Same	Red firm clay
Hilly phase	Ch	10–15	Same	Short strong slopes near or adjacent to drainageways.	Somewhat excessive	Yellowish-brown friable sandy loam underlain by yellowish-red friable heavy sandy loam.	Red firm clay
Rolling phase	Cf	6–10	Same	Fairly smooth interstream divides and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Same	Red firm clay
Steep phase	Cl	15–25	Same	Breaks or short very strong slopes adjoining drainageways.	Somewhat excessive to excessive.	Same	Red firm clay
Undulating phase	Cd	2–6	Same	Smooth interstream divides and mild slopes to or toward drainageways.	Good	Same	Red firm clay
Chewacla fine sandy loam	Cn	0–2	Young alluvial material	First bottoms; subject to overflow.	Somewhat poor	Brown friable fine sandy loam.	Light-brown to brown friable fine sandy loam mottled with gray and reddish brown.
Chewacla silt loam	Co	0–2	Young alluvial material	Same	Somewhat poor	Brown friable silt loam	Light-brown to brown friable silt loam mottled with gray and reddish brown.
Congaree fine sandy loam	Cp	0–2	Young alluvial material	Same	Good	Dark yellowish-brown very friable fine sandy loam.	Yellowish-brown friable fine sandy loam, underlain by strong-brown very friable fine sandy loam.[2]
Congaree silt loam	Cr	0–2	Young alluvial material	Same	Good	Dark yellowish-brown very	Yellowish-brown friable silt

Fulton County, Georgia—Continued

Soil depth [1]	Erosion hazard	Permeability		Moisture-holding capacity	Natural fertility	Workability	Range of suitability	Principal use	Management group
		Surface soil	Subsoil						
Deep	Moderate	Same	Moderate	Moderate	Low	Very good	Wide	Cultivated land and pasture	A-2.
Deep	High	Moderately rapid	Moderate	Moderate	Low	Poor	Narrow	Forest	B-3.
Deep	Moderate to high	Moderately rapid	Moderate	Moderate	Low	Good	Medium	Forest, cultivated land, and pasture.	A-1.
Deep	High to very high	Moderately rapid	Moderate	Moderate	Low	Poor to very poor.	Very narrow	Forest	C-1.
Deep	Slight to moderate	Moderately rapid	Moderate	Moderate	Medium to low	Very good	Wide	Cultivated land and pasture	A-2.
Deep; water table moderately high.	None; alluvial material deposited periodically.	Moderate	Slow	Very high	High	Good	Medium	Cultivated land, pasture, and forest.	A-6.
Same	Same	Moderate	Slow	Very high	Very high	Good	Medium	Same	A-6.
Deep	Same	Moderately rapid	Moderate [2]	Very high	High	Very good	Wide	Cultivated land and pasture	A-5.
Deep	Same	Moderate	Moderate [2]	Very high	Very high	Good	Wide	Same	A-5.
Deep to very deep.	High	Moderate	Moderate	Moderate	Moderate	Poor	Narrow	Same	B-3.
Same	Moderate to high	Moderate	Moderate	Moderate	Moderate	Fair	Medium	Same	A-1.
Same	Slight to moderate	Moderate	Moderate	Moderate	Moderate	Good	Wide	Same	A-2.
Moderately deep to deep.	High	Moderately rapid to moderate.	Moderate	Moderate	Low	Poor	Narrow	Cultivated land, idle land, and pasture.	B-3.
Same	Moderate	Same	Moderate	Moderate	Low	Very good	Wide	Cultivated land and pasture	A-3.
	High to extremely high.			Low to moderate.	Very low	Very poor	Very narrow	Pasture, idle land, and forest	C-1.
Moderately deep.	Moderate to high	Moderately rapid	Slow	Moderately low to low.	Low	Poor	Medium	Cultivated land, idle land, pasture, and forest.	B-4.
Deep to shallow.	High	Moderate	Moderate (Hiwassee); rapid [3] (Louisa).	Moderate to low.	Moderate to low	Poor to very poor.	Narrow	Forest	C-1.
Deep	Moderate to high	Moderate to moderately rapid.	Moderate	Moderate	Moderate	Fair	Medium	Cultivated land and pasture	A-1.
Deep	Moderate	Same	Moderate	Moderate	Moderate	Good	Wide	Same	A-2.
Shallow	Moderate to high	Moderately slow to slow.	Very slow	Moderate to low.	Moderate	Very poor	Narrow	Same	C-1.

Principal characteristics of the soils of

Soil	Map symbol	Slope range	Parent material	Topographic position	Natural drainage	Soil profile	
						Surface soil	Subsoil
		Percent					
Lloyd clay loam:							
Eroded steep phase	Lc	15–25	Residual material from weathered basic rock and intermixed granite, gneiss, or mica schist.	Breaks or very strong slopes along drainageways.	Excessive	Reddish-brown friable clay loam.	Red firm clay loam
Severely eroded hilly phase	Lb	10–15	Same	Short strong slopes near or adjacent to drainageways.	Excessive	Red to reddish-brown friable clay loam	Red firm clay loam

Fulton County, Georgia—Continued

Soil depth [1]	Erosion hazard	Permeability		Moisture-holding capacity	Natural fertility	Workability	Range of suitability	Principal use	Management group
		Surface soil	Subsoil						
Moderately deep.	High to very high	Moderate	Moderate	Moderate to moderately low.	Moderate	Very poor	Very narrow	Forest	C-1.
Moderately deep.	Same	Moderate	Moderate	Same	Moderate	Very poor	Very narrow	Forest	C-1.
Moderately deep.	High	Moderate	Moderate	Same	Moderate	Poor	Narrow	Forest	B-1.
Shallow	High to very high	Rapid	Moderate to rapid	Low	Low	Very poor	Very narrow	Forest	C-1.
Moderately deep to deep.	High	Moderately rapid to moderate.	Moderate	Moderate	Moderate	Poor	Narrow to medium.	Cultivated land, pasture, and forest.	B-3.
Deep to moderately deep.	Moderate to high	Same	Moderate	Moderate	Moderate	Good	Medium	Cultivated land and pasture	A-1.
Same	Slight to moderate	Same	Moderate	Moderate	Moderate	Very good to good.	Wide	Same	A-2.
Deep	High	Moderately rapid	Moderate	Moderate	Moderate	Poor	Narrow to medium.	Forest and pasture	B-3.
Deep	Moderate to high	Moderately rapid	Moderate	Moderate	Moderate	Good	Medium	Cultivated land and pasture	A-1.
Moderately deep.	High to very high	Moderately rapid	Moderate	Moderate	Moderate	Poor to very poor.	Very narrow	Forest	C-1.
Deep	High	Moderate	Moderate	Moderate	Low	Very poor	Very narrow	Forest and idle land	C-1.
Deep	Moderate to high	Moderate	Moderate	Moderate	Low	Poor	Narrow	Same	B-1.
Deep	High to very high	Moderate	Moderate	Moderate	Low	Very poor	Very narrow	Forest	C-1.
Deep	High	Moderately rapid to moderate.	Moderate	Moderate	Low	Poor	Narrow	Forest, cultivated land, and idle land.	B-3.
Deep	Moderate to high	Same	Moderate	Moderate	Low	Good	Medium	Cultivated land and pasture	A-1.
Deep	Very high	Same	Moderate	Moderate	Low	Very poor	Very narrow	Forest	C-1.
Deep	Moderate	Same	Moderate	Moderate	Low	Very good	Wide	Cultivated land and pasture	A-2.
Deep	High	Moderately rapid	Moderate	Moderate	Low	Poor	Narrow	Forest	B-3.
Deep	High to very high	Moderately rapid	Moderate	Moderate	Low	Poor to very poor.	Very narrow	Forest	C-1.
Shallow to moderately deep.	High	Moderate to moderately rapid.	Moderately rapid [2]	Low to very low.	Low	Same	Very narrow	Forest	C-1.
Same	High to very high	Same	Moderately rapid [2]	Very low	Low	Very poor	Very narrow	Forest	C-1.
Moderately deep.	Moderate to high	Moderate	Moderately rapid [2]	Low	Low	Good	Very narrow	Forest and cultivated land	C-1.

Principal characteristics of the soils of

Soil	Map symbol	Slope range	Parent material	Topographic position	Natural drainage	Soil profile	
						Surface soil	Subsoil
		Percent					
Louisa fine sandy loam—Continued:							
Steep phase	Lxb	15–25	Same	Very strong slopes descending from narrow ridge crests.	Somewhat excessive to excessive.	Same	Same [1]
Louisburg sandy loam:							
Hilly phase	Lyc	10–15	Residual material from weathered granite gneiss or granite.	Strong slopes descending from from narrow ridgetops.	Somewhat excessive	Grayish-brown very friable sandy loam.	Yellow friable sandy loam [2]
Rolling phase	Ly	6–10	Same	Narrow fairly smooth ridgetops.	Somewhat excessive	Same	Yellow friable sandy loam [2]
Steep phase	Lyb	15–25	Same	Very strong slopes or breaks adjacent to drainageways.	Somewhat excessive to excessive.	Same	Yellow friable sandy loam [2]
Made land	Ma	0– 2					
Madison clay loam:							
Severely eroded hilly phase	Mc	10–15	Residual material from weathered quartz mica schist.	Short strong slopes near or along drainageways.	Somewhat excessive	Red to reddish-brown friable clay loam.	Red friable clay loam; considerable quantity of mica flakes in lower part.
Severely eroded rolling phase	Mb	6–10	Same	Fairly smooth interstream ridges and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Same	Same
Madison fine sandy loam:							
Eroded hilly phase	Mh	10–15	Same	Short strong slopes near or along drainageways.	Somewhat excessive	Brown very friable fine sandy loam to reddish-brown friable heavy fine sandy loam or light clay loam.	Same
Eroded rolling phase	Mf	6–10	Same	Broad fairly smooth interstream ridges and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Same	Same
Eroded undulating phase	Md	2– 6	Same	Broad smooth interstream ridges and mild slopes to or toward drainageways.	Good	Same	Same
Hilly phase	Mg	10–15	Same	Short strong slopes near or along drainageways.	Somewhat excessive	Brown very friable fine sandy loam.	Same
Rolling phase	Me	6–10	Same	Fairly smooth interstream ridges and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Same	Same
Steep phase	Mk	15–25	Same	Breaks or very strong slopes adjacent to drainageways.	Somewhat excessive to excessive.	Same	Same
Madison gravelly sandy loam:							
Eroded rolling phase	Mm	6–10	Same	Fairly smooth interstream ridges and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Brown very friable gravelly sandy loam to reddish-brown friable heavy gravelly sandy loam or light clay loam.	Same
Rolling phase	Ml	6–10	Same	Same	Same	Brown very friable gravelly sandy loam.	Same
Madison–Grover–Louisa gravelly clay loams, severely eroded hilly phases.	Mn	10–15	Residual material from weathered mica schist or highly micaceous gneiss.	Short strong slopes near or along drainageways.	Somewhat excessive	Red, reddish-brown, light olive-yellow, or yellowish-red friable gravelly clay loam to reddish-brown or yellowish-red very friable micaceous gravelly sandy loam.	Red friable clay loam in the Madison soil; reddish-yellow to brownish-yellow friable sandy clay loam in the Grover; and yellowish-red soft very friable micaceous sandy loam subsurface in the Louisa.
Madison–Grover–Louisa gravelly sandy loams:							
Eroded hilly phases	Mp	10–15	Same	Short strong slopes near or adjoining drainageways.	Somewhat excessive	Brown very friable gravelly sandy loam to reddish-brown very friable heavy gravelly sandy loam or light clay loam in the Madison soil; light olive-yellow friable gravelly sandy loam in the Grover; and brown to reddish-brown very friable gravelly micaceous sandy loam in the Louisa.	Same
Hilly phases	Mo	10–15	Same	Same	Somewhat excessive	Brown very friable gravelly sandy loam in the Madison soil; light olive-yellow friable gravelly sandy loam in the Grover; and brown very friable gravelly micaceous sandy loam in the Louisa.	Same

Fulton County, Georgia—Continued

Soil depth [1]	Erosion hazard	Permeability		Moisture-holding capacity	Natural fertility	Workability	Range of suitability	Principal use	Management group
		Surface soil	Subsoil						
Moderately deep.	High to very high	Moderate	Moderately rapid [2]	Low to very low.	Low	Very poor	Very narrow	Forest	C–1.
Shallow	High	Rapid to moderately rapid.	Moderately rapid to rapid.[2]	Same	Low	Fair	Very narrow	Forest	C–1.
Shallow	Moderate to high	Same	Same [2]	Low	Low	Good	Very narrow	Forest	C–1.
Shallow	High to very high	Same	Same [2]	Low to very low.	Low	Poor to very poor.	Very narrow	Forest	C–1.
									C–1.
Deep	High	Moderate	Moderate	Moderate	Low	Very poor	Very narrow	Forest, idle land, and pasture.	C–1.
Deep	Moderate to high	Moderate	Moderate	Moderate	Low	Poor	Narrow	Same	B–1.
Deep	High	Moderately rapid to moderate.	Moderate	Moderate	Low	Poor	Narrow	Forest, cultivated land, pasture.	B–3.
Deep	Moderate to high	Same	Moderate	Moderate	Low	Good	Medium	Cultivated land and pasture	A–1.
Deep	Moderate	Same	Moderate	Moderate	Low	Good to very good.	Wide	Same	A–2.
Deep	High	Moderately rapid	Moderate	Moderate	Low	Poor	Narrow	Forest	B–3.
Deep	Moderate to high	Moderately rapid	Moderate	Moderate	Low	Good	Medium	Forest, cultivated land, and pasture.	A–1.
Deep	High to very high	Moderately rapid	Moderate	Moderate	Low	Poor to very poor.	Very narrow	Forest	C–1.
Deep	Moderate to high	Moderate to rapid	Moderate	Moderate	Low	Fair	Medium	Cultivated land and pasture	A–1.
Deep	Moderate to high	Rapid	Moderate	Moderate	Low	Fair	Medium	Forest, cultivated land, and pasture.	A–1.
Deep to shallow.	High	Moderate to moderately rapid.	Moderate	Moderate to very low.	Low	Very poor	Very narrow	Forest	C–1.
Deep to shallow.	High	Moderately rapid to moderate.	Moderate	Same	Low to very low.	Poor to very poor.	Narrow to very narrow.	Forest, idle land, and pasture.	B–3.
Deep to shallow.	High	Same	Moderate	Same	Low	Poor	Same	Forest	B–3.

Principal characteristics of the soils of

Soil	Map symbol	Slope range	Parent material	Topographic position	Natural drainage	Soil profile	
						Surface soil	Subsoil
		Percent					
Madison-Grover-Louisa gravelly sandy loams—Continued:							
Steep phases	Mr	15–25	Same	Breaks or short very strong slopes adjacent to drainageways.	Somewhat excessive to excessive.	Same	Same
Mecklenburg gravelly clay loam, eroded hilly phase.	Ms	10–15	Residual material mainly from weathered diorite.	Short strong slopes near or along drainageways.	Same	Dark grayish-brown to reddish-brown friable gravelly clay loam.	Reddish-brown (mottled with brown and yellow) firm clay in upper part; yellow (mottled with olive-yellow) firm clay in lower part.
Mecklenburg gravelly sandy loam, eroded rolling phase.	Mt	6–10	Same	Fairly smooth interstream ridges and moderate slopes to or toward drainageways.	Good to somewhat excessive.	Dark grayish-brown friable gravelly sandy loam.	Same
Mixed alluvium:							
Poorly drained	Mw	0–2	Young alluvial material	First bottoms; subject to over-	Poor	Alluvial material variable in color and ranging from heavy silt	

Fulton County, Georgia—Continued

Soil depth [1]	Erosion hazard	Permeability		Moisture-holding capacity	Natural fertility	Workability	Range of suitability	Principal use	Management group
		Surface soil	Subsoil						
Deep to shallow.	High to very high	Same	Moderate	Same	Low	Poor to very poor.	Very narrow	Forest	C–1.
Moderately deep to deep.	High	Moderate to slow	Slow	Moderate to moderately low.	Moderate	Very poor	Very narrow	Cultivated land, pasture, idle land, and forest.	C–1.
Deep	Moderate to high	Moderate to slow	Slow	Same	Moderate	Poor	Medium	Cultivated land and pasture	A–1.
Deep; water table high.	None	Slow in upper part of soil; very slow in lower part.		Very high	Moderate	Very poor	Very narrow	Forest	B–2.
Deep; water table moderately high.	None; alluvial material deposited periodically.	Moderate in upper part of soil; slow in lower part.		Very high	Moderate	Poor	Narrow	Pasture, forest, and idle land	A–6.
Deep	Same	Moderate throughout the soil		Very high	Moderate	Fair	Medium	Pasture, forest, cultivated land, or idle land.	A–5.
Deep	None to slight	Rapid	Rapid	Low	Low	Very good	Very narrow	Cultivated land, idle land, pasture, and forest.	C–1.
Deep	Slight to moderate	Rapid	Moderately rapid	Moderately low	Low	Very good	Medium	Same	A–2.
Deep; water table high in places.	None, except stream erosion.	Rapid to very rapid throughout the soil		Low to very low.	Low	Very poor	Very narrow	Forest	C–1.
Deep	None; local wash accumulates.	Moderately rapid	Moderate [2]	Moderate	Low	Good	Wide	Cultivated land and pasture	A–3.
Deep	Slight; local wash accumulates.	Moderately rapid	Moderate [2]	Moderate	Low	Good	Wide	Same	A–3.
Deep	None; local wash accumulates.	Moderate	Moderate [2]	Moderate	High	Good	Wide	Same	A–2.
Deep	Slight; local wash accumulates.	Moderate	Moderate [2]	Moderate	High	Good	Wide	Same	A–2.
Shallow to moderately deep.	High	Moderately rapid	Moderate [2]	Moderate	Low	Very poor	Very narrow	Forest	C–1.
Same	Moderate to high	Moderately rapid	Moderate [2]	Moderate	Low	Very poor	Very narrow	Forest	C–1.
Same	High to very high	Moderately rapid	Moderate [2]	Moderate	Low	Very poor	Very narrow	Forest	C–1.
Deep; water table high.	None; alluvial material deposited periodically.	Slow	Very slow	Very high	High	Poor	Narrow	Forest, pasture, and idle land	C–1. B–2.
Same	Same	Slow	Very slow	Very high	High	Very poor	Narrow	Same	B–2.

Principal characteristics of the soils of

Soil	Map symbol	Slope range	Parent material	Topographic position	Natural drainage	Soil profile	
						Surface soil	Subsoil
		Percent					
Wickham fine sandy loam: Eroded undulating phase	Wd	2–6	Moderately young alluvial material.	Low or moderately low stream terraces.	Good	Dark yellowish-brown to dark-red, or reddish-brown friable fine sandy loam to silt loam.	Reddish-brown firm silty clay loam grading into yellowish-red friable silty clay loam in lower part.
Undulating phase	We	2–6	Same	Same	Good	Dark yellowish-brown friable	Same

Fulton County, Georgia—Continued

Soil depth [1]	Erosion hazard	Permeability		Moisture-holding capacity	Natural fertility	Workability	Range of suitability	Principal use	Management group
		Surface soil	Subsoil						
Deep	Slight to moderate.	Moderately rapid to moderate.	Moderate	Moderate	Moderate	Very good	Wide	Cultivated land and pasture	A–2.
Deep	Slight to moderate	Moderately rapid	Moderate	Moderate	Moderate	Very good	Wide	Same	A–2.
Moderately deep to deep.	Moderate to high	Moderate to slow	Very slow	Moderately low.	Low.	Poor	Narrow	Forest and pasture	B–4.
Same	Slight to moderate; local wash accumulates.	Moderate to slow	Very slow	Moderately low.	Low	Poor	Narrow	Forest and pasture	B–4.
Deep	Same	Moderate to slow	Very slow	Moderately low.	Low	Poor	Narrow	Forest and pasture	B–4.

ately deep 20 to 36 inches; deep, 36 to 60 inches; and very deep, 60 inches, or more.

[2] Subsurface; true subsoil generally is not present.

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